Hardware Reference

iC5000 On-Chip Analyzer

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iC5000 Base Unit

Ordering code	IC50000 or IC50000-1

The iC5000 Base Unit is a base platform connecting to the PC via the TCP/IP or USB 2.0 port. It is always used in conjunction with the DTM and/or the I/O module.

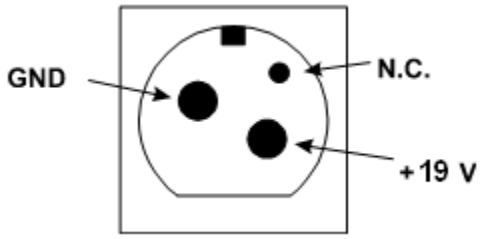
The iC5000 Base Unit features 256MB of analyzer storage buffer.

There are three status LEDs on the iC5000 Base Unit. The status LEDs inform the user of the current status of the emulation system. Their meaning is:

- ⏻ – When lit, the unit is turned on
- R – When lit, the target application being controlled is running
- F – When lit, the unit is free for communication, i.e. winIDEA can connect to it.

Powering the emulator

A round 3-pin power connector is located on the rear of the iC5000 base unit.



Power connector pinout, viewed from the rear of the Emulator

The iC5000 unit accepts a wide input voltage range from 10V to 24V DC, thus enabling the Emulator to work also with a 12V or 24V car battery. Power consumption is up to 6W (iC5000 with Debug/Trace Module, and cable adapter, without I/O module).

The necessary power supply (IC30000-PS) is delivered beside the iC5000 unit.

IC30000-PS

An optional 12V power supply for Car (cigarette lighter) plug can be ordered under the IC30000-PS-CAR12V ordering code.

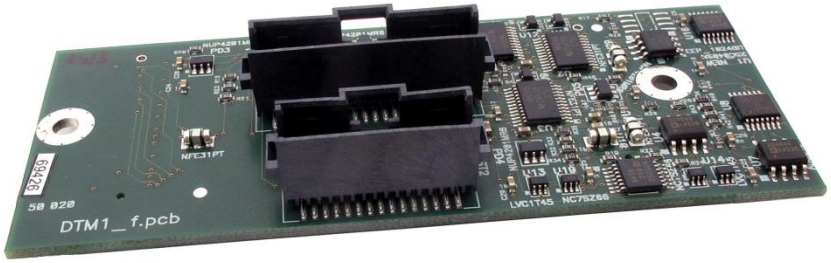
IC30000-PS-CAR12V

Note: Use only original iSYSTEM accessories for powering the iC5000. If you wish to use a power supply different from the delivered one, please consult with iSYSTEM first.

Note: When powering the system, **switch ON emulator before target**; when shutting down the system, **switch OFF target before emulator!**

iC5000 Debug/Trace Module (JTAG/BDM)

Ordering code	IC50020



iC5000 Base Unit in conjunction with the iC50020 Debug/Trace module is a universal on-chip emulation platform. Additionally, a connecting cable (40-pin flat cable), a target specific cable adapter and architecture specific license is required to debug the target based on a specific architecture.

Valid input voltage range for all debug signals is between 1.8 - 5.5V

Note: Typically, IC50000 and IC50020 modules already come assembled together when delivered to the user. The user only needs to connect a specific cable adapter via 40-pin flat cable, through which the development system then connects to the target.

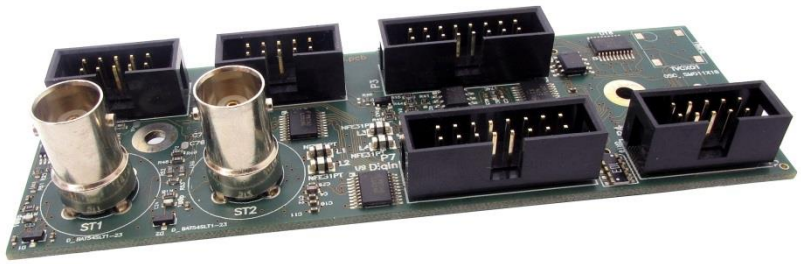
iC5000 development and test system including also an optional IO module

40-pin flat cable used to connect architecture specific debug cable adapters to the iC5000 Debug/Trace module.

16-bit Nexus (IC50152), 16-bit ETM (IC50115) and 10-pin Infineon DAP (IC50163) cable adapters come with two flat cables (30-pin and 40-pin) pre-attached. With these, 40-pin flat cable, which is shipped next to the Debug/Trace module (IC50020), is not required. Note that these debug cable adapters require iC5000 Debug/Trace module revision D or newer, and cannot be connected to the older revisions.

iC5000 I/O Module (IOM2)

Ordering code	**IC50011**



- System Port: inter-emulator synchronization and trigger output, 100ohm series termination.
- Digital inputs: 8 channels, 10kOhm input impedance, 5V tolerant, ESD protected.
- Digital outputs: 8 channels, 100ohm output series termination, ESD protected.
- Analog inputs: 2 channels, 8-bit ADCs, 1MOhm input impedance, range is ±5.0V with 1:1 probe, ±50V with a 10:1 probe, 3ns acquisition time.
  Power measurement probe uses these two inputs for power measurement. (Available on rev. C and later)
- Analog outputs: 2 channels, 8-bit DACs, ±4.5V bipolar output, ±7mA drive, 100ohm output resistance.
- Optional 10MHz temperature compensated precision oscillator TCXO for a high accuracy long duration trace/analyzer session measurements.

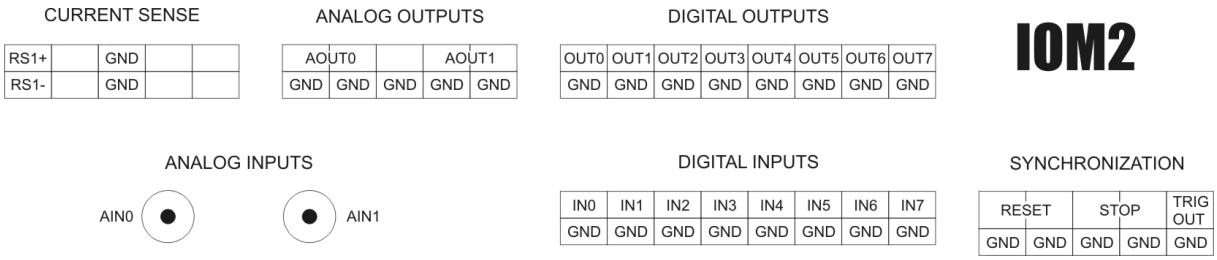
All digital signals are 3.3V LVTTL compatible and are ESD protected.

All analog signals have a Schottky diode over- / undervoltage protection, except the Current Sense signals.

The maximum voltage on the Current Sense probe is 60V.

Nominal sampling rate is 1MSPS.

Connectors



iC5000 I/O Module Connectors' Pinout

- 10-pin header for the System Port.
- 16-pin header for 8 digital inputs.
- 16-pin header for 8 digital outputs.
- 10-pin header for 2 analog outputs.
- 2 BNC connectors for 2 analog inputs.
- 10-pin header for Power Measurement Port (rev. C and later).

All connectors, except the BNCs, are standard Berg 2.54mm / 100mils raster.

For analog inputs, standard scope probes can be used.

Note: For more details on I/O module and its use, refer to a separate standalone document titled I/O Module user's manual.

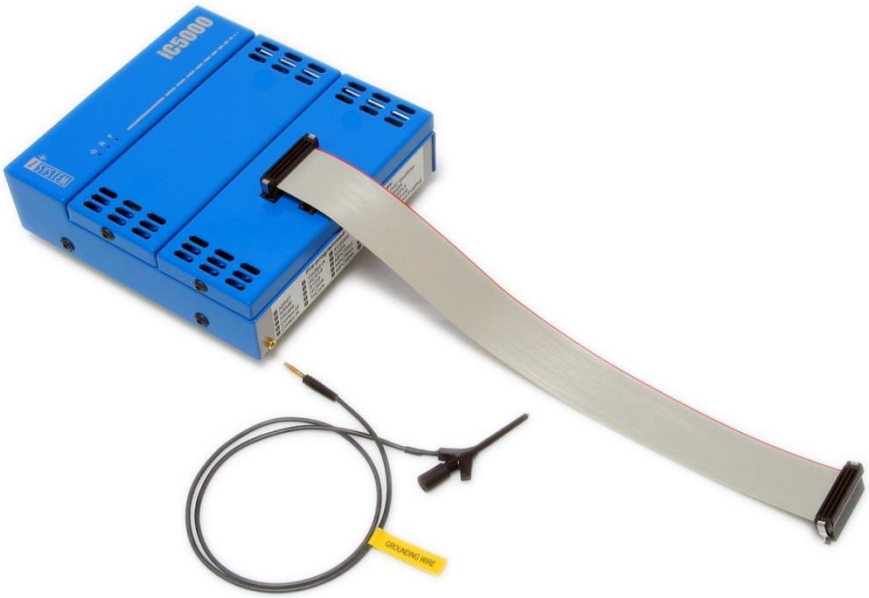
Using grounding wire

In case of the on-chip emulation, it has been proven that a development tool can be damaged at the moment when the emulator's debug connector is plugged into the target system when neither the target nor the emulator are powered up yet. At this point in time, there could be ground potential difference between the emulator and the target way over 1000V. Such voltage difference is then discharged over the emulator and the target, which can destroy electronic components of the emulator and/or the target.

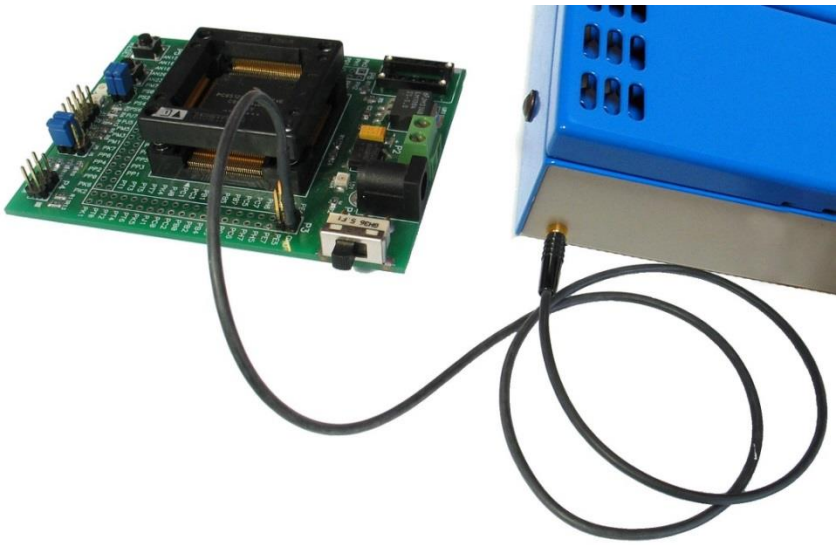
The voltage difference can be introduced by:

- power supply (target, emulator), which does not have the power outlet ground connected with the power supply ground.
- power outlets which have different ground potentials
- PC, when iC5000 connects to the PC through the USB port

Connecting a dedicated grounding wire, which is shipped with the iC5000 unit, between the iC5000 system and the target before the target debug cable adapter is connected to the target, makes the complete development system even more robust and resistant to the mentioned electrical discharge problem - despite the fact the iC5000 development system features already a high quality protection on all connecting signals by default.



iC5000 with the grounding wire and the ground pin in the left bottom corner



The grounding wire connecting the target and iC5000

Licenses

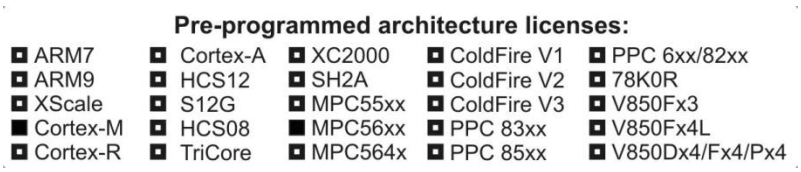
iC5000 introduces a new licensing model. As with all iSYSTEM tools, winIDEA license is required. Valid winIDEA license also includes iSYSTEM technical support service, and can be requested either by phone or by e-mail support@isystem.com.

Besides winIDEA license, at least one CPU architecture license is required in order to connect to the target microcontroller via debug interface. Advanced functionalities such as trace, profiling and code coverage become available via trace license. Make sure that the target debug connector to which ic5000 system connects, exposes microcontroller trace port (ETM, Nexus …) when trace functionality is required.

iSYSTEM development tools feature a hardware based license scheme, which saves costs comparing to per-seat based licenses. All licenses are kept in the iC5000 development system, which conveniently allows moving iC5000 unit from one development seat to another.

When new iC5000 system is shipped from iSYSTEM, CPU architecture and trace licenses are preprogrammed by the iSYSTEM test department. With such a new system, only winIDEA license needs to be requested from iSYSTEM after receiving the iC5000 system. Additional CPU architecture license, which are purchased later, must be programmed by the user.

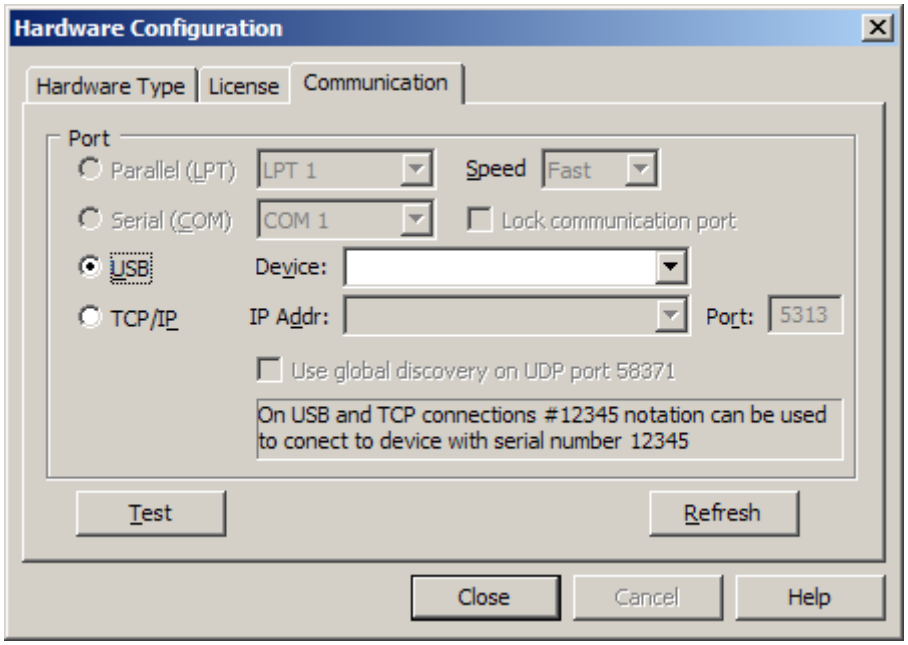
Below picture shows the sticker, which can be found on iC5000 system, identifying which CPU architecture licenses were preprogrammed by the iSYSTEM test department. Below picture shows preprogrammed Cortex-M3 and MPC56xx licenses.



Communication

iC5000 supports two types of communication: 10/100M Ethernet and USB 1.1/2.0. It is recommended to use USB2.0 interface since it provides the fastest transfer from the iC5000 development system to the PC where winIDEA IDE runs. This will guarantee a maximum performance of the iC5000 development system.

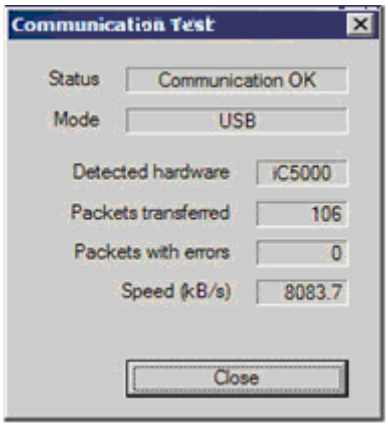
Specify the communication port through which the iC5000 unit connects to the PC in the Hardware/Hardware/Communication tab.



Hardware Configuration dialog, Communication page

- Universal Serial Bus (USB) - select when the Emulator is attached to the PC's USB port. The Emulator is selected in the Device pull-down menu. When the Emulator is connected to the USB port of a computer for the first time, Windows will detect a new device and prompt you for the driver for it. Specify the path to the USB directory in the winIDEA installation directory. **If only one emulator is connected to a PC via USB then Device combo box can be left empty (recommended). In this case if you exchange the emulator with another one, you don't have to change communication settings.**
- TCP/IP – This option sets the TCP/IP properties of the iC5000. See 'Setting up TCP/IP communication' section for more details on TCP/IP setup.

Use the 'Test' button to test the communication settings.



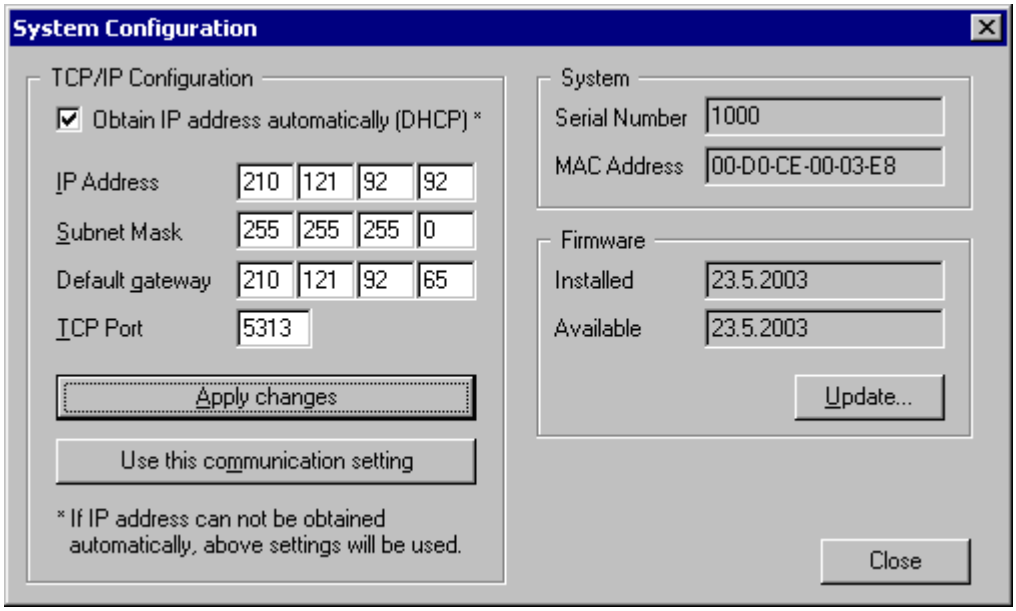
Communication test window

Setting up TCP/IP communication

If the Emulator is connected using the Ethernet, its TCP/IP settings must be configured on both sides: the Emulator and in winIDEA.
More information on configuring the Emulator and winIDEA can be found in the Hardware User's Guide.

First step: Configuring the Emulator

The Emulator must be connected using an alternate option – either through the serial port, through the parallel port or through USB. The connection must be set up in the 'Hardware/Communication' tab. Then, select the 'Hardware/Hardware Type' tab and click on the 'System Configuration…' button.



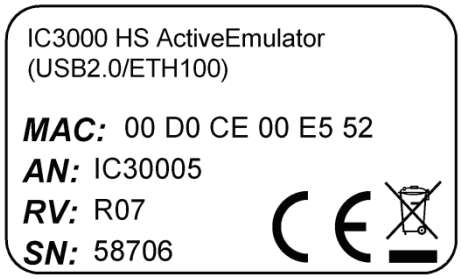
System configuration options

The TCP/IP settings can be obtained from the DHCP server on the network. If such a server is not available, the settings can be set manually. In this case, in the TCP/IP Configuration window, the IP Address, the Subnet Mask and the TCP Port must be specified. The default gateway address must be specified, if the Emulator is used via a gateway. The IP Address, available for the Emulator to use, the Subnet Mask and the default gateway, if needed, are usually defined by your network administrator. The TCP Port can be any port between 1024 and 65535, which is not already used. By default, the TCP port 5313 is used. For the information, if this port address could cause any conflicts and for an alternative port address, also contact your network administrator. When the correct settings are entered, click on the 'Apply changes' button. This writes the changes to the Emulator.

If you want winIDEA to use these settings, press the "Use this communication setting" button. Then, close the System configuration window.

The Emulator must be switched off and then on again in order for changes to take effect.

Emulator's MAC address is written on the same sticker where you will also find device serial number as it is shown on the next picture.

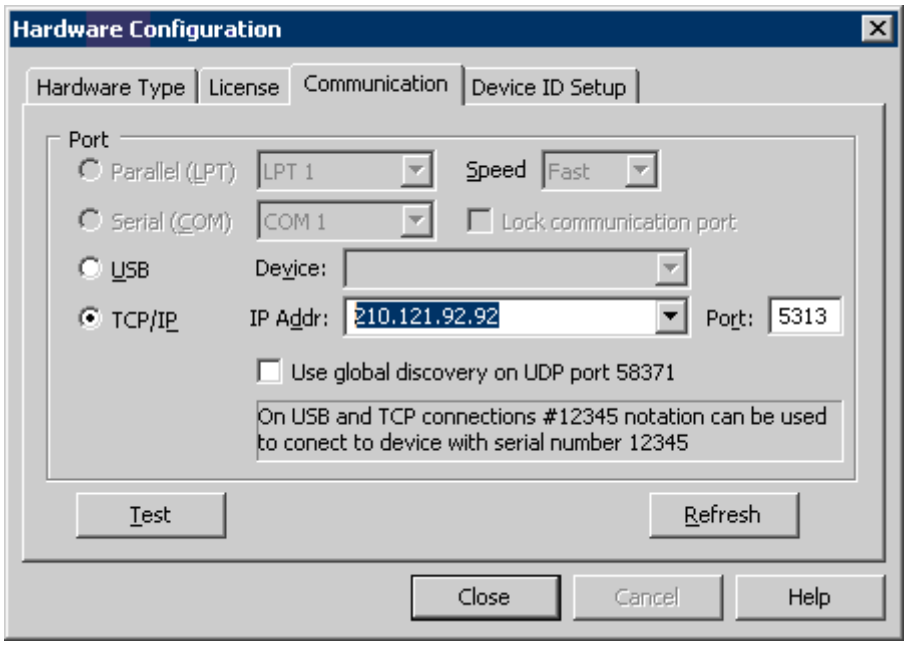


Second step: Configuring

There are two ways of configuring TCP/IP in winIDEA: manually or by automatic discovery.

- *Manual Configuration*

Select the Hardware/Communication tab.

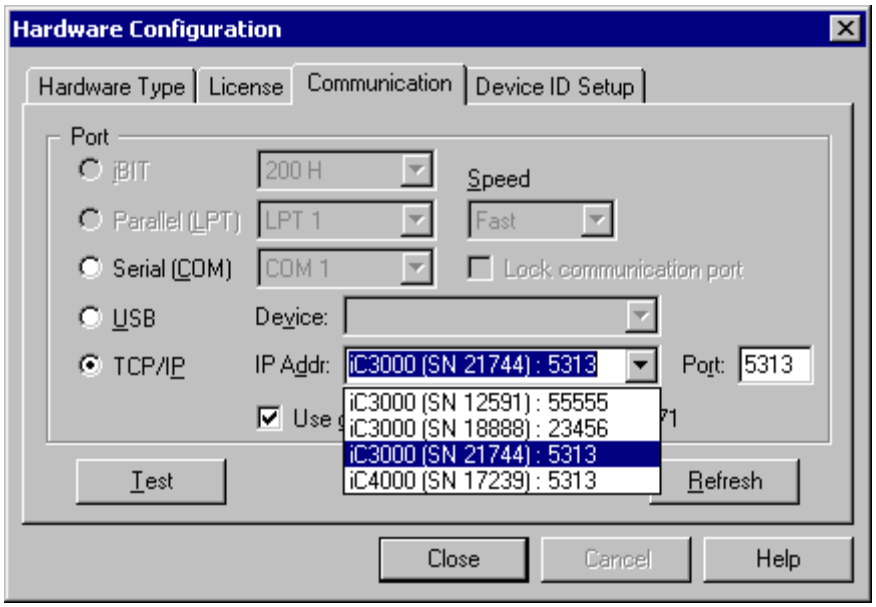


Hardware/Communication tab

If the "Use this communication setting" button was used when configuring the Emulator, these settings should already be set as required. If this option was not used, select the TCP/IP button and enter the IP Address and the TCP Port, as entered above into the Emulator. Connect the Emulator to the Ethernet, if not already connected, and click on the 'Test' button. The communication should be up and running.

- *Configuration with Automatic Discovery*

Select the Hardware/Communication tab.



Display of discovered emulators

First, select 'TCP/IP' type of communication. Then select the 'Use global discovery on UDP port 58371' and press the Refresh button.

In the pull-down window all emulators found on the network will be shown. The correct emulator can be identified by its serial number. Select the emulator and press the 'Test' button to ensure the communication is possible.
To be able to easier identify your own emulator, you can specify an unique port number in the first step (for example, as shown above, 23456; the number can be any number between 1024 and 65535, that is not already used on your network for other purposes – note that on the other hand more emulators can have the same port number), uncheck the 'Use global discovery' option, enter the port number, if the correct one is not entered already, and press the refresh button. Now, only the emulators on the network that use this port will be shown.

Troubleshooting TCP/IP

If the communication test fails, there could be a problem with the IP Address, the Subnet Mask, the Default gateway address or the TCP Port.
First, make sure the Subnet Mask is correct. The subnet mask should be the same in the TCP/IP configuration of your computer and in the Emulator.
To find out the TCP/IP settings of your computer, open the command prompt and type 'ipconfig'. The computer will return something like this:

```
Ethernet adapter Local Area Connection:
        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : 210.121.92.121
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . . : 210.121.92.65
```

Enter the same Subnet Mask and the Default Gateway data into Emulator.
Next, make sure, the IP Address is not already used by any other device. The easiest way to do that is to disconnect the Emulator from the Ethernet, open a command prompt and type in 'ping <ip_address>' where <ip_address> is the IP Address selected when configuring the Emulator, in the above example you would type in 'ping 210.121.92.92' (without quotes). The result should be 'Request timed out…'. If the result of the command is anything else (like 'Reply from…'), the IP is already taken and you should choose another one. If the result is correct, type in 'ping <ip_address> -w 500 –t', in the above example this would mean 'ping 210.121.92.92 –w 500 –t' . This command pings the IP address every 500 milliseconds until you stop it with Control+C. You should constantly receive the information 'Request timed out'. Then, while the ping command is running, connect the Emulator and turn it on. Now, in a few moments, a ping reply should occur, in the form of 'Reply from <ip_address>'… If this is not the case, the IP was set wrong. Try setting the IP again or select another one. If this is the case and the Emulator still cannot communicate with winIDEA, the TCP Port setting is wrong. Please select another port, set it up in the Emulator and in winIDEA and try again. When the ping is not more required, stop it using the keyboard shortcut Control+C.

If more Emulators are connected to the Ethernet and have the same IP set, only one will be active. Every Emulator must have a unique IP.

Troubleshooting USB

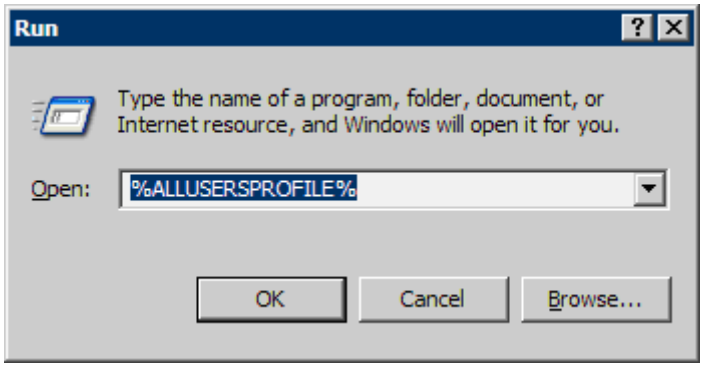
During winIDEA installation USB driver is also installed. Very rarely after you power on the emulator which you connected to PC Windows show errors:

1. USB device not recognized
2. Cannot Install this Hardware.

If first error is displayed you should:

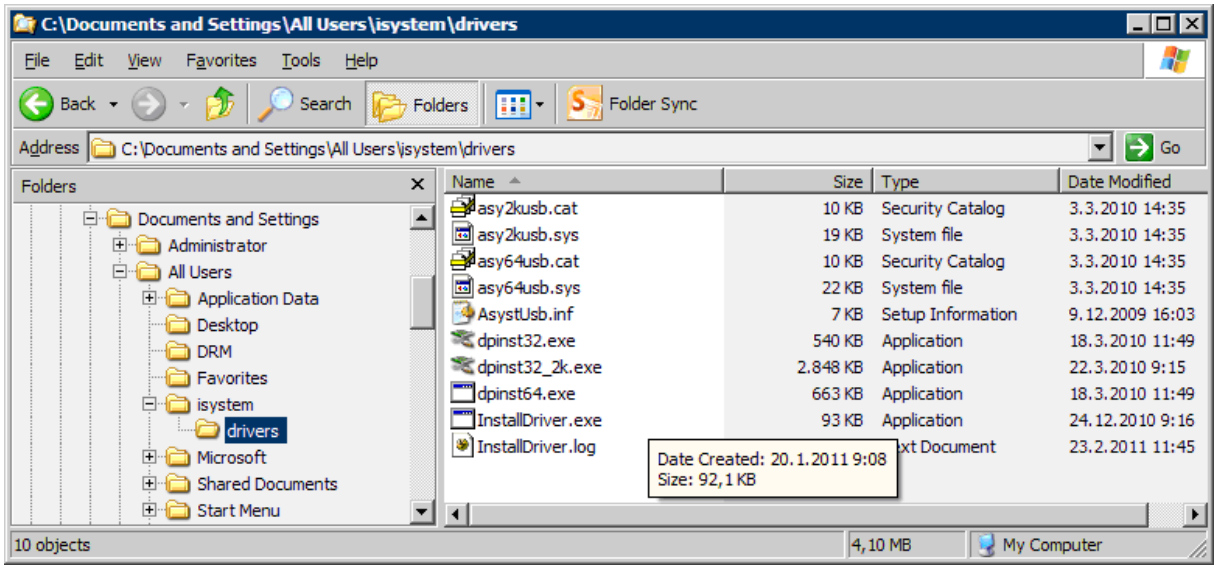
- Check cable or use another USB cable.
- Connect emulator to another USB port
- Connect emulator to a different USB port. The one that resides on a PCI or PCIe card.
- Connect emulator to a PC via powered USB switch. In case a PC (usually a laptop) cannot provide enough power over USB port.

If second error is displayed or the above suggestions for the first error don't solve the problem you should reinstall the driver. Use the following procedure.
In Windows click on the start menu and select run, then type %ALLUSERSPROFILE% and press OK.



Run Dialog which shows how to find folder with iSystem USB drivers

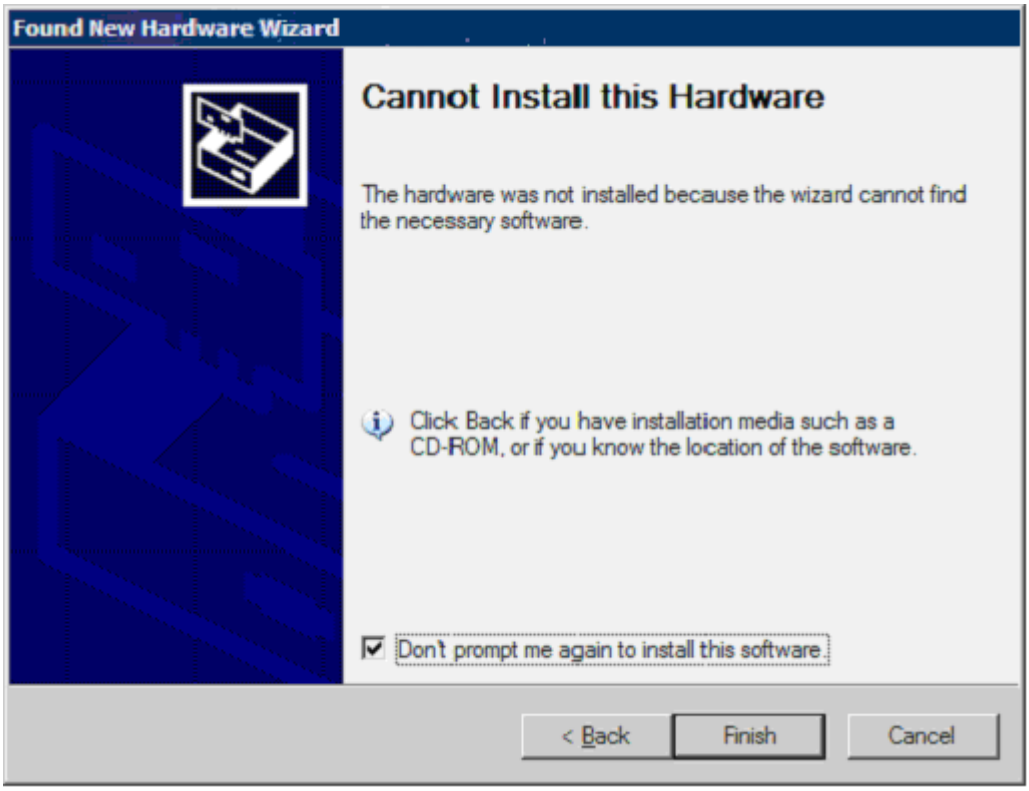
Windows explorer window will be shown. Open isystem\drivers folder and you should see the same files as on the below screenshot.



iSystem USB drivers shown in Windows explorer

Power down the emulator and double click on the InstallDriver.exe file which first installs new driver and then uninstalls older driver and removes registry entries which point to older driver.

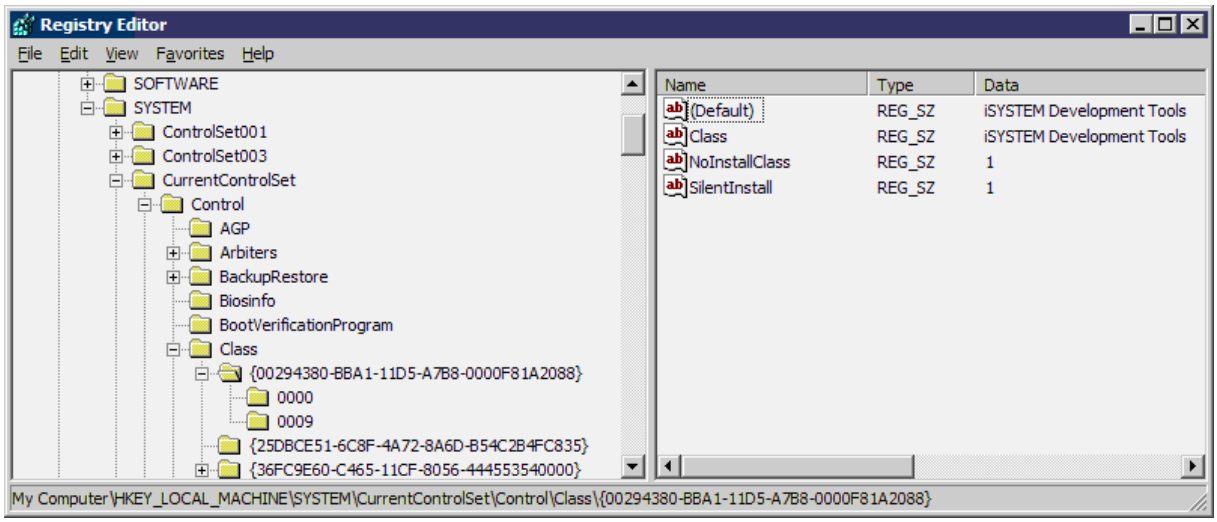
If Windows still shows “Cannot install this Hardware” dialog then manual driver uninstall procedure should be performed.



Cannot Install this Hardware error message

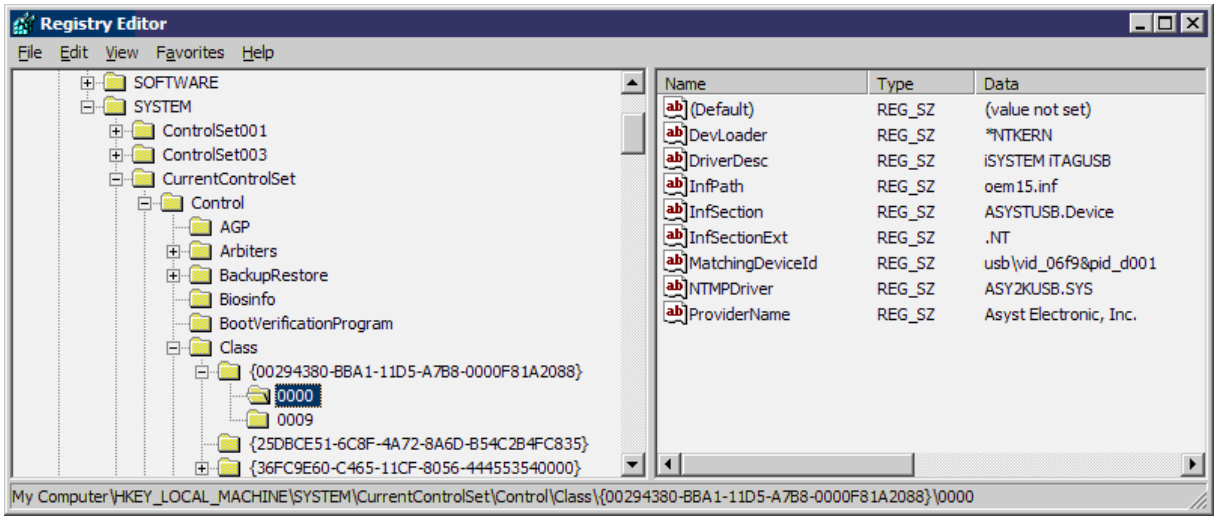
Manual uninstallation of drivers

To manually uninstall driver you should first identify the files you must remove from the computer.
From the Windows start menu select Run and type regedit and press the OK button.
In regedit locate the key HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Class
Press CTRL + F and enter iSystem in the search dialog and press OK.



Regedit window

- Regedit should display a key with several strings as shown above. Under this key there are also subkeys represented by numbers. Click on such a key and inside locate a string named InfPath which points to an INF file. Locate this INF file in c:\Windows\Inf folder and delete it. Repeat the procedure for all different INF files found in registry.



Regedit window showing a key which points to an old USB driver

- Then delete the main key (with all subkeys) which holds the data of all enumerated iSystem devices. In example shown above the key is {00294380-BBA1-11D5-A7B8-0000F81A2088}.
- At the end remove the folder where winIDEA installs the driver, for example:
  C:\Documents and Settings\All Users\isystem\drivers
  The folder path is different on windows 7 and Vista.
- Now, restart the PC and again install the iSystemDriverPack which you can find here:
  http://www.isystem.com/downloads/winIDEA/driver/isystem_usb_driver_setup.exe

The above procedure can be executed only if you have administrator rights.

Trace Line Calibration

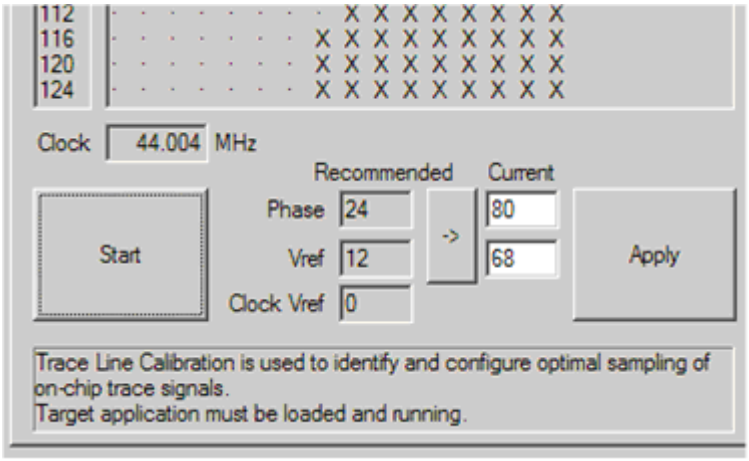
Majority of the modern embedded microcontrollers providing trace functionality, implements a so called message based trace port, where an individual trace message is broadcasted off the microcontroller through a relatively narrow physical trace port in multiple CPU cycles, at frequencies, which can be well over 100 MHz. Typically, the trace port is combined from trace data lines and a trace clock line, which is used to sample trace data lines on rising, falling or both edges (depending on the individual implementation).

At lower frequencies and good signal integrity we can consider the clock and data lines as pure digital signals, which are correctly phase aligned. As such, the external trace tool can capture them accurately without any problems.

Nowadays, capturing of the valid trace data becomes more and more challenging due to the various signal integrity issues (noise, skew, crosstalk, reflections, ground bounce…), which are introduced either due to the high frequency trace clock & data, due to the bad target PCB design or a combination of both. IC5000 has the ability to compensate for these issues via Trace Line Calibration functionality, which allows shifting threshold voltage and clock phase at the capture time of the trace data. When Trace Line Calibration is performed, it auto scans over these two dimensions and searches for valid and invalid settings and finds an optimum data eye.

Example

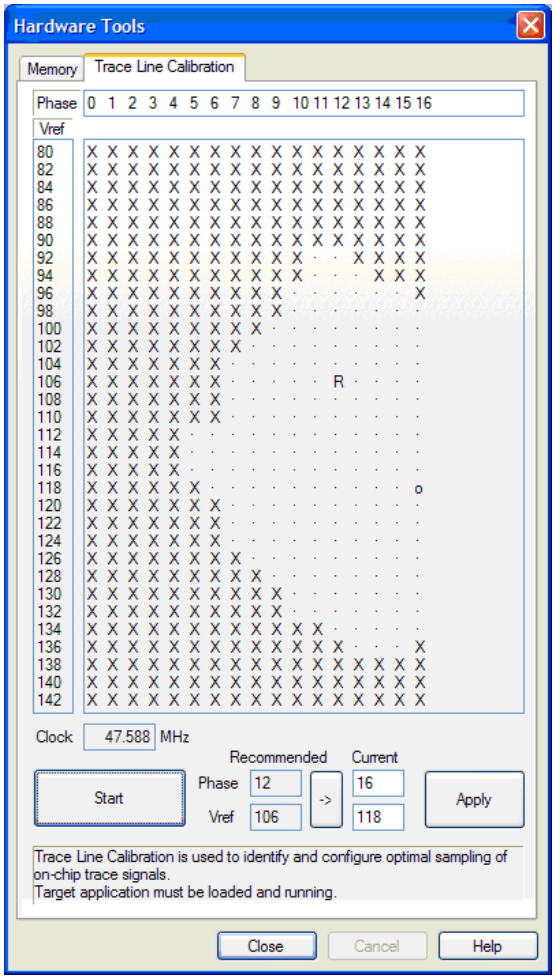
Let's assume we have a Cortex-M3 based NXP LPC1768 microcontroller running at 95 MHz. At this frequency, some of the signal integrity issues will show up for sure. After the debug download, the application should be run. Next, the "Start" button in the "Hardware/Tools/ Trace Line Calibration" should be pressed, which starts the auto-scan. After a couple of seconds, the result of the scan is collected and recommended "Vref" and "Phase" values are provided. Typically, the user just needs to press the "->" button to use the recommended values (or, if desired, enter them manually) and finally use the Apply button.



Configuration part of the Trace Line Calibration dialog

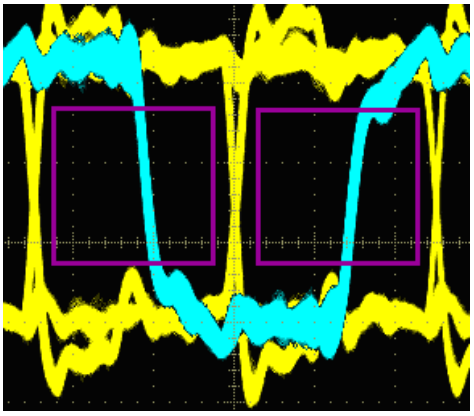
Newly applied values are stored upon Save Workspace and also used on the next debug download.

The following picture shows the result of the Trace Line Calibration and the corresponding timing view of signals on the trace port.

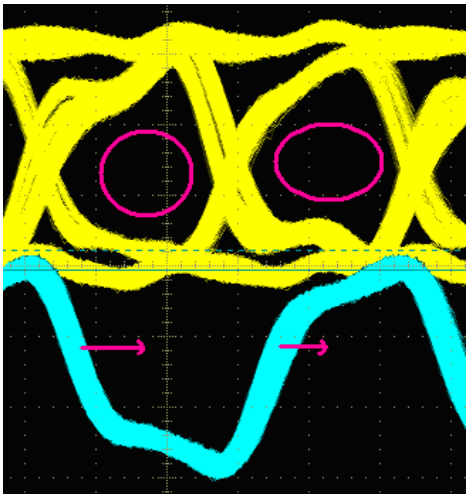


Trace Line Calibration window – scan has been performed and applied.

X	invalid area
.	valid area
R	recommended
o	currently used



Good signal integrity at lower frequency with large "Data eyes"



Higher frequency: Valid "Data eyes" shown on upper data signal and how the clock (lower) must be delayed.

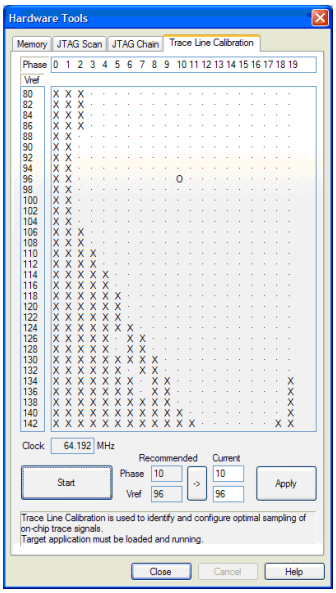
Trace Port PCB Design Guidelines

This section contains some guidelines, which should be considered during the target PCB design to ensure the correct operation of the trace port (ETM, Nexus,…) and the external trace tool (iC5000, iTRACE GT). Note that the quality and timing of the trace port signals to the external trace tool are critical for correct and reliable trace operation.

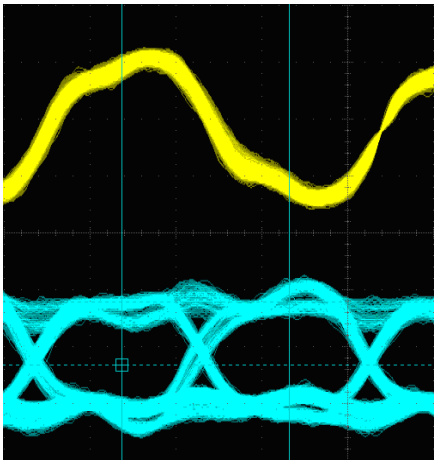
- All trace port lines on the PCB should be as short as possible (max ~2,5 cm),
- Traces should run on the same layer, or layers with the same impedance.
- Preferred layer impedance is 50 Ohm.
- Connector's ground pins should be connected directly to PCB's GND plane.
- Trace clock should be serially terminated by 47 Ohm resistor as close as possible to the driver. The value of the resistor may be changed depending on driver characteristics.
- Trace clock should be clean of crosstalk – if possible with double distance to closest nets.
- Trace clock should have only point-to-point connection – any stubs should be avoided.
- It is strongly recommended also for other (data) lines to be point-to-point only. If any stubs are needed, they should be as short as possible, when longer are required, there should be a possibility to optionally disconnect them (e.g. by jumpers).
- Trace port data bus inner crosstalk is not so important, but it is critical to isolate the whole bus from other signals (including from the trace port clock).

The following examples show, how the length of the trace lines is reflected in signal integrity and consequently in functionality. One of typical evaluation boards was used, where the CPU is located on the upper piggyback board, which fits to the lower, larger measurement board.

Trace lines with short stubs

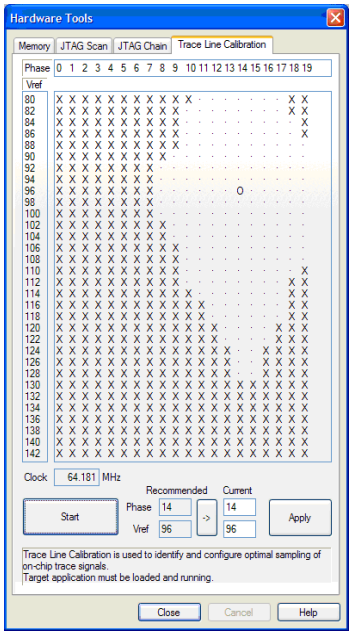


Trace Line Calibration result

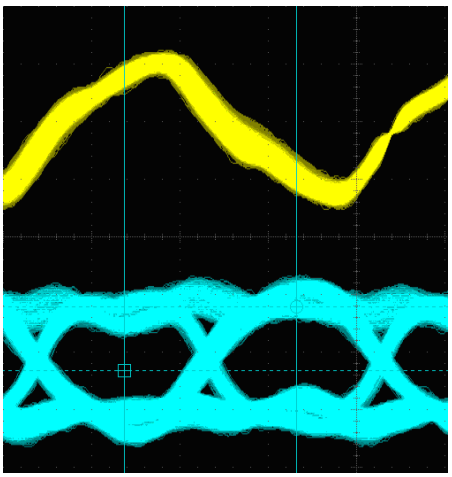


Measured by oscilloscope

Trace lines with longer stubs (over connector to other board)

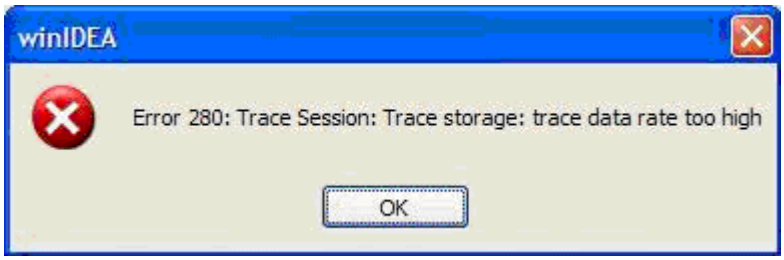


Trace Line Calibration result



Measured by oscilloscope

Emulation Notes



Above message can occur when using trace. It indicates that the DDR (trace storage RAM) input FIFO, which accepts trace data from the system domain, has overflowed, and some portion of the trace data will be missing. It doesn't mean any hardware failure. Possible solutions:

- lower the target CPU clock
- increase Nexus clock divider, which yields lower Nexus clock, but at the same time Nexus is more prone to overflows then
- changing the trace port width e.g. from 16 bit to 12 bit or from 12 bit to 4 bit reduces the Nexus information bandwidth. Note that possible port size varies depending on the target CPU.
- IC50000-1 (ordering code) has higher trace storage bandwidth than IC50000.

Debug Cable Adapters

Various cable adapters are available depending on the specific target architecture and the target debug connector. They are used to connect iC5000 development system to the target.

Ordering code	Adapter
IC50111-1	20-pin 2.54mm ARM Cable Adapter
IC50111-2	20-pin 2.54mm Cortex Debug Cable Adapter
IC50112	14-pin 2.54mm ARM Cable Adapter
IC50113-AMP	20-pin 1.27mm AMP Cortex Debug Cable Adapter
IC50114	Mictor 38-pin ARM ETM 8-bit Cable Adapter
IC50115	Mictor 38-pin ARM ETM 16-bit Cable Adapter
IC50116	10-pin 1.27mm Cortex Debug Cable Adapter
IC50118	20-pin 1.27mm Cortex Debug Cable Adapter
IC50119	20-pin 1.27 x 2.54mm Compact TI-20 Cable Adapter
IC50130	26-pin 2.54 mm ColdFire Cable Adapter
IC50140	6-pin 2.54mm BDM Cable Adapter
IC50141	6-pin 2.54mm S12Z Cable Adapter
IC50150	14-pin 2.54mm MPC5xxx Cable Adapter
IC50151	Mictor 38-pin MPC5xxx Nexus 8-bit Cable Adapter
IC50152 IC50152-12	Mictor 38-pin MPC5xxx Nexus 16-bit Cable Adapter
IC50153	16-pin 2.54mm Freescale COP Cable Adapter
IC50154	51-pin GLENAIR Cable Adapter
IC50155	Mictor 38-pin PPC4xx RISCTrace Cable Adapter
IC50156	50-pin Samtec MPC5xxx Nexus 16-bit Cable Adapter
IC50158	Mictor 38-pin MPC5xx Nexus 8-bit Cable Adapter
IC50160	16-pin 2.54mm Infineon JTAG Cable Adapter
IC50160-ECU14	10-pin 1.27mm Tricore ECU14 Cable Adapter
IC50160-MEDC17	10-pin 1.27mm Tricore MEDC17 Cable Adapter
IC50162	6-pin 2.54mm Infineon I2C Cable Adapter
IC50163	10-pin 1.27mm Infineon DAP2 Wide Cable Adapter
IC50170	16-pin 2.54mm Renesas 78K0R Serial Cable Adapter
IC50171	20-pin 2.54mm Renesas V850/RH850 Cable Adapter
IC50172	26-pin KEL Renesas V850 Cable Adapter
IC50173	14-pin 2.54mm Renesas SuperH Cable Adapter
IC50174	10-pin 2.54mm Renesas 78K0 Serial Cable Adapter
IC50175	14-pin 2.54mm Renesas RL78 Serial Cable Adapter
IC50176	14-pin 2.54mm Renesas RH850 Cable Adapter
IC50177	Mictor 38-pin Renesas RH850 Nexus 16-bit Cable Adapter
IC50190	4-pin ERNI ST STM8 Cable Adapter

Signal direction definition used throughout this document:

O - output from the debugger to the target microcontroller

I - input to the debugger from the target microcontroller

- 20-pin 2.54mm Cortex Debug Cable Adapter

Ordering code	IC50111-2

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Cortex-M (M0, M0+, M1, M3, and M4) based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 20-pin 2.54 pitch target debug connector with Cortex-M pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
I	Reference voltage	VTref	1	2	SWDIO/TMS	SWD/JTAG	I/O
	Ground	GND	3	4	SWCLK/TCK	SWD/JTAG	O
	Ground	GND	5	6	SWO/TDO	SWD/JTAG	I
	Ground	GND	7	8	NC/TDI	SWD/JTAG	O
	Ground	GND	9	10	nSRST	System Reset	I/O
	Ground	GND	11	12	TRCLK	Trace Clock	I
	Ground	GND	13	14	TRD0	Trace Data 0	I
	Ground	GND	15	16	TRD1	Trace Data 1	I
	Ground	GND	17	18	TRD2	Trace Data 2	I
	Ground	GND	19	20	TRD3	Trace Data 3	I

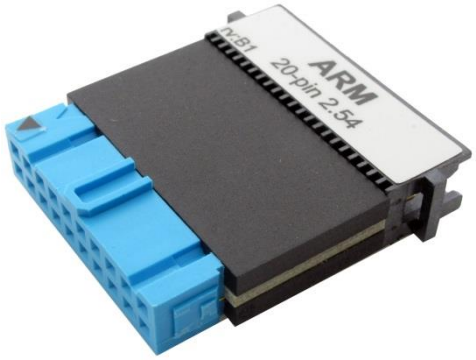
20-pin Cortex-M pinout

Note: 20-pin 2.54mm Cortex-M Cable Adapter features resettable fuses on pins 1, 2, 4, 6, 8 and 10. These protect debug signals against overcurrent. These fuses cycle back to a conductive state after the excessive current fades away.

The adapter connects to the target via a 20-pin 2.54 mm connector (for example Yamaichi: FAS-2001-2101-2-0BF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 020 216 21).

- 20-pin 2.54mm ARM Cable Adapter

Ordering code	IC50111-1



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Cortex-A, Cortex-R, or ARM7, ARM9 based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 20-pin 2.54 pitch target debug connector with ARM pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
I	Reference voltage	VTref	1	2	NC	Not Connected	
O	Debug JTAG	nTRST	3	4	GND	Ground	
O	Debug JTAG	TDI	5	6	GND	Ground	
O	Debug JTAG	TMS	7	8	GND	Ground	
O	Debug JTAG	TCK	9	10	GND	Ground	
I	Return TCK	RTCK	11	12	GND	Ground	
I	Debug JTAG	TDO	13	14	GND	Ground	
I/O	System Reset	nSRST	15	16	GND	Ground	
O	Debug request	DBGRQ	17	18	GND	Ground	
I	Debug Acknowledge	DBACK	19	20	GND	Ground	

20-pin ARM pinout

Note: 20-pin 2.54mm ARM Cable Adapter features resettable fuses on all pins except for pin 11 and 19. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

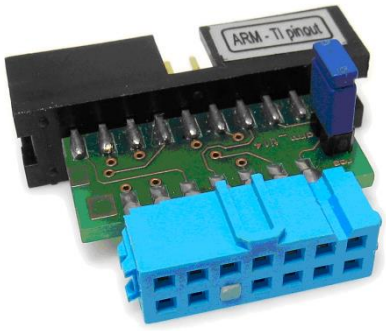
The adapter connects to the target via a 20-pin 2.54 mm connector (for example Yamaichi: FAS-2001-2101-2-0BF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 020 216 21).

Texas Instruments Microcontrollers

Note that targets based on Texas Instruments (TI) ARM microcontroller may feature Texas Instruments ARM 14-pin target debug connector with TI proprietary pinout.

A dedicated adapter is available for Texas Instruments ARM 14-pin pinout and can be ordered separately under IAPIN20ARM14TI ordering code. Make sure you don't mix up Texas Instruments pinout with standard 14-pin 2.54mm ARM pinout (cable adapter IC50112).
Double check the pinout of the target debugs connector with the debug cable adapter pinout before connecting it to the target for the first time.

Ordering code	**IAPIN20ARM14TI**



With this adapter, the following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
Output	Standard JTAG	TMS	1	2	nTRST	Standard JTAG	Output
Output	Standard JTAG	TDI	3	4	GND	Ground	
Input	Reference voltage	VTref	5	6	NC	Not connected	
Input	Standard JTAG	TDO	7	8	GND	Ground	
Input	Return TCK	RTCK	9	10	GND	Ground	
Output	Standard JTAG	TCK	11	12	GND	Ground	
Input	Debug Acknowledge	BERR	13	14	nSRST	System Reset	In/Out

ARM7 14-pin TI target connector

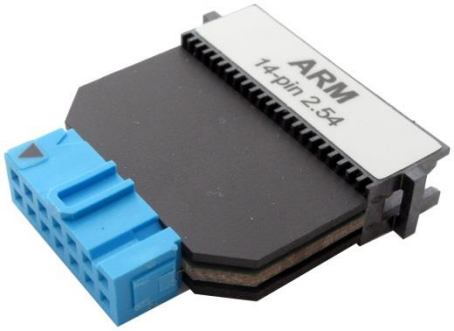
A jumper is present on the adapter. If this jumper is set, the SYSTEM RESET line is connected to pin 14 on the target side. If SYSTEM RESET is not needed, then this jumper should be removed.

Note: this adapter can only be used with 20-pin 2.54mm ARM Cable Adapter

The adapter connects to the target via a 14-pin 2.54 mm connector (for example Yamaichi: FAS-1401-2101-2-0BF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 014 216 21).

- 14-pin 2.54mm ARM Cable Adapter

Ordering code	IC50112



IC50112 ARM Cable Adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Cortex-A, Cortex-R, or ARM7, ARM9 based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 14-pin 2.54 pitch target debug connector with ARM pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
	Not Connected	NC	1	2	GND	Ground	
O	Debug JTAG	nTRST	3	4	GND	Ground	
O	Debug JTAG	TDI	5	6	GND	Ground	
O	Debug JTAG	TMS	7	8	GND	Ground	
O	Debug JTAG	TCK	9	10	GND	Ground	
I	Debug JTAG	TDO	11	12	nSRST	System Reset	I/O
I	Reference voltage	VTref	13	14	GND	Ground	

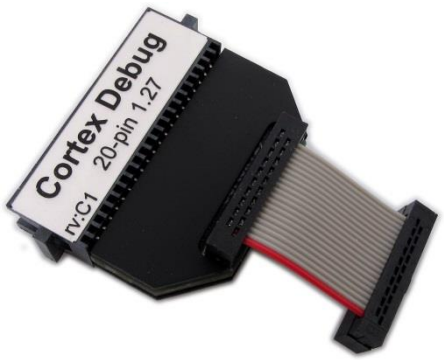
14-pin ARM pinout

Note: 14-pin 2.54mm ARM Cable Adapter features resettable fuses on all pins. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

The adapter connects to the target via a 14-pin 2.54 mm connector (for example Yamaichi: FAS-1401-2101-2-0BF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 014 216 21).

- 20-pin 1.27mm Cortex Debug Cable Adapter

Ordering code	IC50113



Note: This product is obsolete and is fully replaced with IC50118

IC50113 Cortex-M Adapter Board is used to connect the iC5000 development system to Cortex-M (M1, M3, M4) based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 20-pin 1.27mm pitch target debug connector with Cortex-M pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
I	Reference voltage	VTref	1	2	SWDIO/TMS	SWD/JTAG	I/O
	Ground	GND	3	4	SWCLK/TCK	SWD/JTAG	O
	Ground	GND	5	6	SWO/TDO	SWD/JTAG	I
	Ground	GND	7	8	NC/TDI	SWD/JTAG	O
	Ground	GND	9	10	nSRST	System Reset	I/O
	Ground	GND	11	12	TRCLK	Trace Clock	I
	Ground	GND	13	14	TRD0	Trace Data 0	I
	Ground	GND	15	16	TRD1	Trace Data 1	I
	Ground	GND	17	18	TRD2	Trace Data 2	I
	Ground	GND	19	20	TRD3	Trace Data 3	I

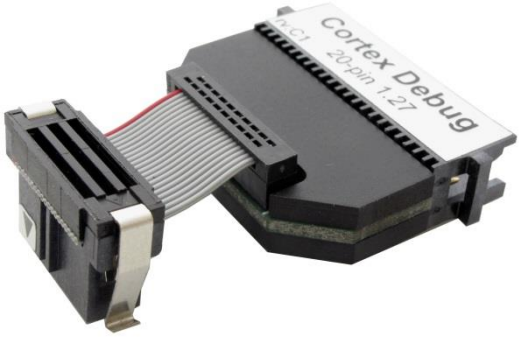
20-pin Cortex-M pinout

Note: 20-pin 1.27mm Cortex-M Cable Adapter features resettable fuses on pins 1, 2, 4, 6, 8 and 10. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. Signals on pins 12, 14, 16, 18 and 20 are protected via 100 ohm serial resistors.

The adapter connects to the target via a 20-pin 1.27mm connector (for example SAMTEC: FFSD-10-01-N). A target should feature a matching part (for example SAMTEC: FTSH-110-01-F-DV-K).

- 20-pin 1.27mm AMP Cortex Debug Cable Adapter

Ordering code	IC50113-AMP



IC50113-AMP Cortex-M Cable Adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Cortex-M (M1, M3, M4) based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 20-pin 1.27mm AMPMODU target debug connector with Cortex-M pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
I	Reference voltage	VTref	1	2	SWDIO/TMS	SWD/JTAG	I/O
	Ground	GND	3	4	SWCLK/TCK	SWD/JTAG	O
	Ground	GND	5	6	SWO/TDO	SWD/JTAG	I
	Ground	GND	7	8	NC/TDI	SWD/JTAG	O
	Ground	GND	9	10	nSRST	System Reset	I/O
	Ground	GND	11	12	TRCLK	Trace Clock	I
	Ground	GND	13	14	TRD0	Trace Data 0	I
	Ground	GND	15	16	TRD1	Trace Data 1	I
	Ground	GND	17	18	TRD2	Trace Data 2	I
	Ground	GND	19	20	TRD3	Trace Data 3	I

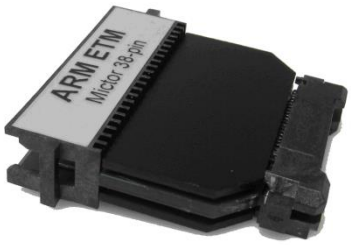
20-pin Cortex-M pinout

Note: 20-pin 1.27mm AMPMODU Cortex-M Cable Adapter features resettable fuses on pins 1, 2, 4, 6, 8 and 10. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. Signals on pins 12, 14, 16, 18 and 20 are protected via 100 ohm serial resistors.

The adapter connects to the target via a 20 -pin AMP connector (for example TE connectivity, part number 1-111196-8). A target should feature a matching part (for example TE connectivity part number 5-104549-2 in SMT technology).

- Mictor 38-pin ARM ETM 8-bit Cable Adapter

Ordering code	IC50114



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to ARM7/ARM9 based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring Mictor 38-pin target debug connector with ARM7/ARM9 ETM pinout.

Only 4 or 8-bit ETM port width (physical port size) is supported with this adapter. However, it can be also used for ETM trace on targets where physically more than 8 ETM data lines are connected to the target debug connector by configuring the on-chip ETM module for operation with 8 or less data lines (‘Hardware/CPU Setup/ETM tab). Note that ETM port bandwidth proportionally drops off when less ETM data lines are used and trace overflows are more likely to occur. If maximum bandwidth is needed, use IC50115, ARM ETM 16-bit cable adapter.

The following pinout is valid on the target side:

Signal direction	Signal	Pin	Pin	Signal	Signal direction
	NC	1	2	NC	
	NC	3	4	NC	
	NC	5	6	TRACECLK	I
	NC	7	8	NC	
I/O	nSRST	9	10	NC	
I	TDO	11	12	VTref	I
	NC	13	14	NC	
O	TCK	15	16	TRACEPKT[7]	I
O	TMS	17	18	TRACEPKT[6]	I
O	TDI	19	20	TRACEPKT[5]	I
O	nTRST	21	22	TRACEPKT[4]	I
	NC	23	24	TRACEPKT[3]	I
	NC	25	26	TRACEPKT[2]	I
	NC	27	28	TRACEPKT[1]	I
	NC	29	30	TRACEPKT[0]	I
	NC	31	32	TRACESYNC	I
	NC	33	34	PIPESTAT[2]	I
	NC	35	36	PIPESTAT[1]	I
	NC	37	38	PIPESTAT[0]	I

8-bit ARM ETM target pinout

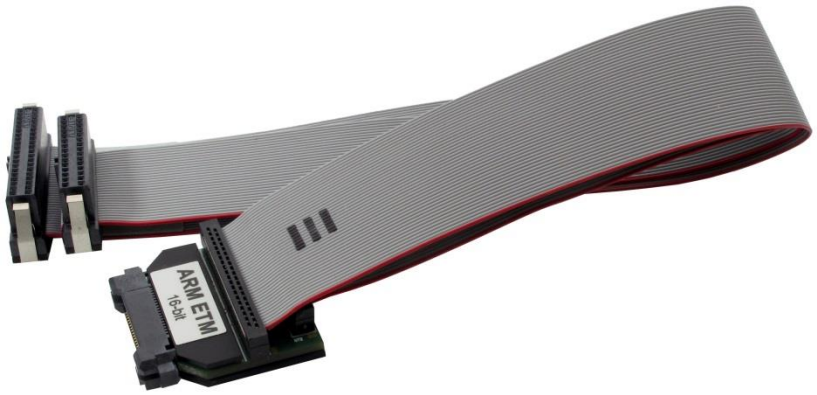
Blue colored signals are required for trace.

Note: Mictor 38-pin ARM ETM Cable Adapter features resettable fuses on pins 9, 11, 12, 15, 17, 19 and 21. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. Signals on pins 6, 16, 18, 20, 22, 24, 26, 26, 28, 30, 32, 34, 36 and 38 are protected via 47 ohm serial resistors.

The adapter connects to the target via a 38-pin Mictor connector (Tyco Electronics 5767055-1). A target should feature a matching part (for example Tyco Electronics 5767081-1 in SMT technology).

- Mictor 38-pin ARM ETM 16-bit Cable Adapter

Ordering code	IC50115



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to ARM7/ARM9 based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring Mictor 38-pin target debug connector with ARM7/ARM9 ETM pinout.

The same cable adapter covers ETMv1 and ETMv3 pinout. The following pinout is valid on the target side:

Signal direction	Signal	Pin	Pin	Signal	Signal direction
	NC	1	2	NC	
	NC	3	4	NC	
	NC	5	6	TRACECLK	I
	NC	7	8	NC	
I/O	nSRST	9	10	NC	
I	TDO	11	12	VTref	I
	NC	13	14	NC	
O	TCK	15	16	TRACEPKT[7]	I
O	TMS	17	18	TRACEPKT[6]	I
O	TDI	19	20	TRACEPKT[5]	I
O	nTRST	21	22	TRACEPKT[4]	I
I	TRACEPKT[15]	23	24	TRACEPKT[3]	I
I	TRACEPKT[14]	25	26	TRACEPKT[2]	I
I	TRACEPKT[13]	27	28	TRACEPKT[1]	I
I	TRACEPKT[12]	29	30	TRACEPKT[0]	I
I	TRACEPKT[11]	31	32	TRACESYNC	I
I	TRACEPKT[10]	33	34	PIPESTAT[2]	I
I	TRACEPKT[9]	35	36	PIPESTAT[1]	I
I	TRACEPKT[8]	37	38	PIPESTAT[0]	I

ETMv1 target pinout

Blue colored signals are required for trace.

Signal direction	Signal	Pin	Pin	Signal	Signal direction
	NC	1	2	NC	
	NC	3	4	NC	
	GND	5	6	TRACECLK	I
	NC	7	8	NC	
I/O	nSRST	9	10	NC	
I	TDO	11	12	VTref	I
	NC	13	14	NC	
O	TCK	15	16	TRACEDATA7	I
O	TMS	17	18	TRACEDATA6	I
O	TDI	19	20	TRACEDATA5	I
O	nTRST	21	22	TRACEDATA4	I
I	TRACEDATA15	23	24	TRACEDATA3	I
I	TRACEDATA14	25	26	TRACEDATA2	I
I	TRACEDATA13	27	28	TRACEDATA1	I
I	TRACEDATA12	29	30	GND	I
I	TRACEDATA11	31	32	GND	I
I	TRACEDATA10	33	34	VCC	I
I	TRACEDATA9	35	36	TRACECTL	I
I	TRACEDATA8	37	38	TRACEDATA0	I

ETMv3 target pinout

Blue colored signals are required for trace.

Note: Mictor 38-pin ARM ETM Cable Adapter features resettable fuses on pins 9, 11, 12, 15, 17, 19 and 21. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. Signals on pins 6, 16, 18, 20 and 22-38 are protected via 47 ohm serial resistors.

The adapter connects to the target via a 38-pin Mictor connector (Tyco Electronics 5767055-1). A target should feature a matching part (for example Tyco Electronics 5767081-1 in SMT technology).

Texas Instruments TMS570 Microcontrollers

Targets based on Texas Instruments (TI) ARM microcontroller can feature MIPI 60-pin target debug connector with Texas Instruments proprietary pinout instead of 38-pin Mictor. MIPI term stands for Mobile Industry Processor Interface and is a standardized connector for debugging and tracing up to 40 data lines.

A dedicated adapter (converter) is available for Texas Instruments MIPI 60-pin pinout and can be ordered separately under the IAMIC38MIPI60TMS570 ordering code.

Double check the pinout of the target debugs connector with the debug cable adapter pinout before connecting it to the target for the first time.

Ordering code	**IAMIC38MIPI60TMS570**

Note: This adapter is always used in conjunction with the IC50115 cable adapter.

iC5000 / iC5500 / iC6000 can trace up to 16 trace data lines. The target microcontroller has to be configured for 16-bit trace port operation if the target features MIPI connector with 32 data trace lines connected.

iSYSTEM high-end iTRACE GT development platform can capture 32-bit data trace port too.

Note that signal naming in iSYSTEM documentation uses target signal names and not the ones from the MIPI standard. Refer to 'MIPI Alliance Recommendation for Debug and Trace Connectors' and 'ARM Target Interface Connections' documentation for more information about signal names and their functions.

With this adapter, the following pinout is valid on the target side:

Signal direction	Signal	Pin	Pin	Signal	Signal direction
I	VTref	1	2	TMS	O
O	TCK	3	4	TDO	I
O	TDI	5	6	nSRST	I/O
O	RTCK	7	8	nTRST_PD	O
O	nTRST_PU	9	10	NC	
	NC	11	12	NC	
I	TRACECLK	13	14	NC	
	NC	15	16	GND	
I	TRACECTL	17	18	NC	
I	TRACEDATA0	19	20	NC	
I	TRACEDATA1	21	22	NC	
I	TRACEDATA2	23	24	NC	
I	TRACEDATA3	25	26	NC	
I	TRACEDATA4	27	28	NC	
I	TRACEDATA5	29	30	NC	
I	TRACEDATA6	31	32	NC	
I	TRACEDATA7	33	34	NC	
I	TRACEDATA8	35	36	NC	
I	TRACEDATA9	37	38	NC	
I	TRACEDATA10	39	40	NC	
I	TRACEDATA11	41	42	NC	
I	TRACEDATA12	43	44	NC	
I	TRACEDATA13	45	46	NC	
I	TRACEDATA14	47	48	NC	
I	TRACEDATA15	49	50	NC	
	NC	51	52	NC	
	NC	53	54	NC	
	NC	55	56	NC	
	GND	57	58	GND	
	NC	59	60	NC	

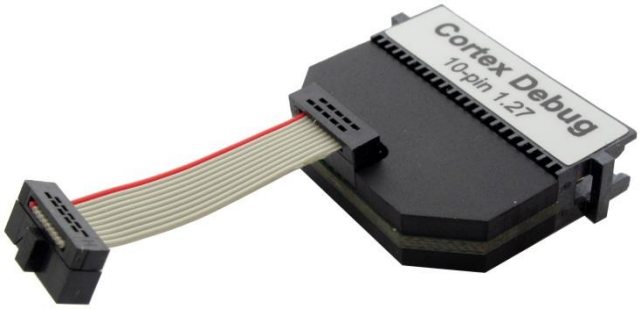
60-pin MIPI target connector

Blue colored signals are required for trace.

The adapter connects to the target via a 60-pin MIPI connector (for example SAMTEC: QTH-030-01-L-D-A). A target should feature a matching part (for example SAMTEC: QSH-030-01-L-D-A).

- 10-pin 1.27mm Cortex Debug Cable Adapter

Ordering code	IC50116



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Cortex-M (M0, M0+, M1, M3, M4) based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 10-pin 1.27mm pitch target debug connector with Cortex-M pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
I	Reference voltage	VTref	1	2	SWDIO/TMS	SWD/JTAG	I/O
	Ground	GND	3	4	SWCLK/TCK	SWD/JTAG	O
	Ground	GND	5	6	SWO/TDO	SWD/JTAG	I
	Ground	GND	7	8	NC/TDI	SWD/JTAG	O
	Ground	GND	9	10	nSRST	System Reset	I/O

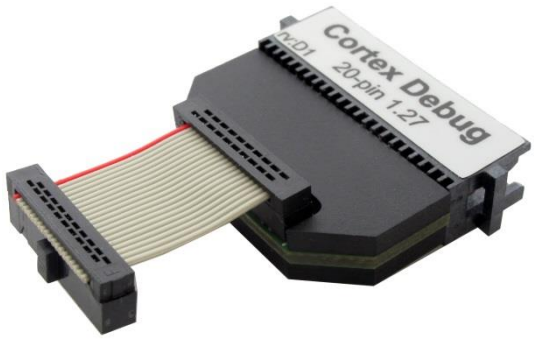
10-pin Cortex-M pinout

Note: 10-pin 1.27mm Cortex-M Cable Adapter features resettable fuses on pins 1, 2, 4, 6, 8 and 10. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

The adapter connects to the target via a 10-pin 1.27mm connector (for example SAMTEC: FFSD-05-01-N). A target should feature a matching part (for example SAMTEC: SHF-105-01-L-D-TH).

- 20-pin 1.27mm Cortex Debug Cable Adapter

Ordering code	IC50118



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Cortex-M (M1, M3, M4) based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 20-pin 1.27mm pitch target debug connector with Cortex-M pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
I	Reference voltage	VTref	1	2	SWDIO/TMS	SWD/JTAG	I/O
	Ground	GND	3	4	SWCLK/TCK	SWD/JTAG	O
	Ground	GND	5	6	SWO/TDO	SWD/JTAG	I
	Ground	GND	7	8	NC/TDI	SWD/JTAG	O
	Ground	GND	9	10	nSRST	System Reset	I/O
		NC_CAPGND	11	12	TRCLK	Trace Clock	I
		NC_CAPGND	13	14	TRD0	Trace Data 0	I
	Ground	GND	15	16	TRD1	Trace Data 1	I
	Ground	GND	17	18	TRD2	Trace Data 2	I
	Ground	GND	19	20	TRD3	Trace Data 3	I

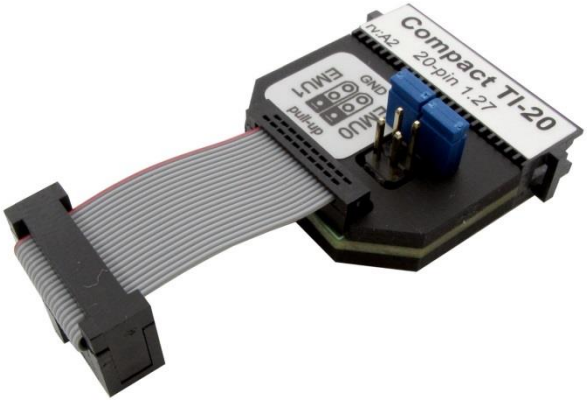
20-pin Cortex-M pinout

Note: 20-pin 1.27mm Cortex-M Cable Adapter features resettable fuses on pins 1, 2, 4, 6, 8 and 10. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. Signals on pins 12, 14, 16, 18 and 20 are protected via 100 ohm serial resistors.

The adapter connects to the target via a 20-pin 1.27mm connector (for example SAMTEC: FFSD-10-01-N). A target should feature a matching part (for example SAMTEC: FTSH-110-01-F-DV-K).

- 20-pin 1.27 x 2.54 mm Compact TI-20 Cable Adapter

Ordering code	IC50119



This adapter is typically used to connect the iC5000 / iC5500 / iC6000 development system to Texas Instruments targets, which can feature Texas Instruments proprietary target debug connector. It connects to Debug/Trace module on the debug/test tool side and to the target debug connector on the other side. It can be used for targets featuring 20-pin 1.27 x 2.54 mm target debug connector with Compact TI-20 pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
O	Standard JTAG	TMS	1	2	nTRST	Standard JTAG	O
O	Standard JTAG	TDI	3	4	GND	Ground	
I	Reference voltage	VTref	5	6	KEY	Not connected	
I	Standard JTAG	TDO	7	8	GND	Ground	
I	Return TCK	RTCK	9	10	GND	Ground	
O	Standard JTAG	TCK	11	12	GND	Ground	
I	Emulation pins	EMU0	13	14	EMU1	Emulation pins	I
I/O	System Reset	nSRST	15	16	GND	Ground	
I	Emulation pins	EMU2	17	18	EMU3	Emulation pins	I
I	Emulation pins	EMU4	19	20	GND	Ground	

20-pin Compact TI-20 pinout

Jumpers J1 and J2

Jumpers J1 and J2 selects whether EMU0 (J1) or EMU1 (J2) is tied to pull-up (position 1-2) or directly to the GND (position 2-3).
EMU signals' functions may vary from board to board. See target board manual and schematics for more information on how to set the jumpers.

Note: 20-pin 1.27 x 2.54 mm Compact TI-20 Cable Adapter features resettable fuses on all pins except for pin 9, 13, 14, 17-19. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. Signals on pins 13, 14, 17-19 are protected via 100 ohm serial resistors.

The adapter connects to the target via a 20-pin 1.27 x 2.54 mm connector (for example Sullins Connector Solutions: SFH41-PPPB-D10-ID-BK). A target should feature a matching part (for example SAMTEC: FTR-110-51-G-D-P).

- 26-pin 2.54 mm ColdFire Cable Adapter

Ordering code	IC50130

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Freescale ColdFire based target. It connects between the Debug/Trace module and the target debug connector. It can be used for targets featuring 26-pin 2.54mm pitch target debug connector with ColdFire pinout.

The following pinout is valid on the target side:

Signal direction	Signal	Pin	Pin	Signal	Signal direction
I	Developer Reserved	1	2	~BKPT	O
	GND	3	4	DSCLK	O
	GND	5	6	Developer Reserved	
	RESET	7	8	DSI	O
I	VDD_IO	9	10	DSO	I
	GND	11	12	PSTDDATA7	I
I	PSTDDATA6	13	14	PSTDDATA5	I
I	PSTDDATA4	15	16	PSTDDATA3	I
I	PSTDDATA2	17	18	PSTDDATA1	I
I	PSTDDATA0	19	20	GND	
	Motorola Reserved	21	22	Motorola Reserved	
	GND	23	24	PSTCLK	I
	NC	25	26	~TEA	O

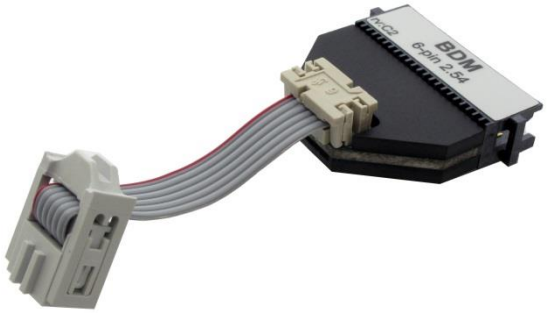
ColdFire 26-pin target pinout

Note: 26-pin 2.54 mm ColdFire Cable Adapter features resettable fuses on pins 2, 4, 7, 8, 9, 10, 24 and 26. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. Signals on pins 1, 12-19 and 24 are protected via 47 ohm serial resistors.

The adapter connects to the target via a 26-pin 2.54 mm connector (for example Yamaichi: FAS-26-17). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 026 216 21).

- 6-pin 2.54mm BDM Cable Adapter

Ordering code	IC50140



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Freescale HCS08, HC12, HCS12, S12X or ColdFire V1 based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 6-pin 2.54mm pitch target debug connector with BDM pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
I/O	BGND	BGND	1	2	GND	Ground	
	Not connected	NC	3	4	RESET	System Reset	I/O
	Not connected	NC	5	6	VTref	Reference voltage	I

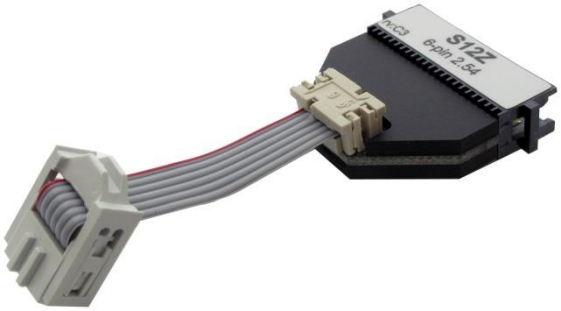
6-pin BDM pinout

Note: 6-pin BDM Cable Adapter features resettable fuses on pins 1, 2, 4 and 6. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

The adapter connects to the target via a 6-pin 2.54 mm connector (for example FCI: 71600-006LF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 006 216 21).

- 6-pin 2.54mm S12Z Cable Adapter

Ordering code	IC50141



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Freescale S12Z based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 6-pin 2.54mm pitch target debug connector with S12Z BDM pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
I/O	BGND	BGND	1	2	GND	Ground	
I	data out	PDO	3	4	RESET	System Reset	I/O
I	clock	PDOCLK	5	6	VTref	Reference voltage	I

6-pin BDM pinout

Note: 6-pin BDM Cable Adapter features resettable fuses on pins 1, 2, 4 and 6. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. Signals on pins 3 and 5 are protected via 47 ohm serial resistors

The adapter connects to the target via a 6-pin 2.54 mm connector (for example FCI: 71600-006LF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 006 216 21).

- 14-pin 2.54mm MPC5xxx Cable Adapter

Ordering code	IC50150

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Freescale MPC5xxx and ST SPC56 based target via JTAG debug interface. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 14-pin 2.54mm pitch target debug connector with MPC5xxx pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
O	Standard JTAG	TDI	1	2	GND	Ground	
I	Standard JTAG	TDO	3	4	GND	Ground	
O	Standard JTAG	TCK	5	6	GND	Ground	
O		EVTIN	7	8	PORST*	Power On Reset*	O
I/O	System Reset	nSRST	9	10	TMS	Standard JTAG	O
I	Reference voltage	VTref	11	12	GND	Ground	
	Not connected	NC	13	14	JCOMP	(optional) Standard JTAG	O

14-pin MPC5xxx & SPC56 target pinout

Mandatory pins on the microcontroller side are GND, VDD, RESET, TMS, TDI, TDO and TCK.

*Note: Pin 8 (Power on reset) is supported with adapter revision C1 or newer.

JCOMP is an optional pin. Some microcontrollers don't have this pin. Internally, this is actually JTAG TRST which resets JTAG TAP state machine. Because JTAG TAP state machine can be reset also by TMS and TCK, this pin is optional also for the debugger. If microcontroller has JCOMP pin but it is not connected to the target debug connector then it must be set to non-active state in the target via a pull-up resistor. If not then JTAG TAP state machine remains in reset and debugging is not possible.

14-pin 2.54mm MPC5xxx Cable Adapter features resettable fuses on all connected pins. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

Jumper J1 (TCK)

Note: Jumper J1 was introduced with rv: D1, previous versions (rv: A1, A2, B1, C1, C2) do not have this jumper.

If the TCK (debug JTAG clock) signal path from the target debug connector to the target microcontroller is not designed as single point to point connection, user may experience signal integrity problems. For example, the TCK electrical signal degrades if it's is routed to multiple points, e.g. to the target microcontroller and also to some other IC(s), or expansion connector(s) or even to another PCB. In such cases, signal integrity gets improved by adding a buffer on the TCK driver side (J1: position 2-3).
Normally jumper J1 should be kept in default 1-2 position. When experiencing problems with the initial debug connection or later unstable operation of the debugger, position 2-3 should be tested too.

Jumper J2 (EVTIN)

Note: It was introduced with rv: C1, some previous versions (rv: A1, A2, B1, D1) do not have this jumper.

Under some circumstances it can happen that the debugger cannot find any absolute program counter message in the analyzed Nexus trace block. Consequentially, trace reconstruction fails and errors or nothing gets displayed in the trace window. To avoid such situations, the debugger can feed periodic signal to the EVTIN CPU pin connecting to the on-chip Nexus engine, which then periodically generates and broadcasts program counter synchronization messages.
In order to use this feature, jumper J2 must be bridged and the 'Force periodic Nexus SYNC' option in the 'Hardware/emulation Options/CPU Setup/Nexus' tab must be checked. Refer to iSYSTEM 'Freescale MPC5xxx & ST SPC56 Family On-Chip Emulation' technical notes document for more details on the 'Force periodic Nexus SYNC' option use.
Note that the EVTI (Nexus Event In) CPU pin may be shared with other CPU functionalities. For instance, on MPC5516 the same pin can operate as GPIO, EBI read/write or EVTI. Whenever the CPU pin is configured and used for EVTI alternate operation, J2 must not be populated in order to prevent electrical conflicts.

Note: In general there is no need to use 'Force periodic Nexus SYNC' functionality unless a specific application code is traced, which does not generate messages containing absolute program counter information. As long as the user has no problems with the trace use, it is recommended to keep jumper J2 disconnected.

The adapter connects to the target via a 14-pin 2.54 mm connector (for example Yamaichi: FAS-1401-2101-2-0BF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 014 216 21).

- Mictor 38-pin MPC5xxx Nexus 8-bit Cable Adapter

Ordering code	IC50151

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Freescale MPC5xxx or ST SPC56 based target via Nexus debug interface. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring Mictor 38-pin target debug connector with MPC5xxx Nexus pinout.

This adapter supports 2, 4 or 8-bit Nexus port width only. However, it can be also used for Nexus trace on targets where physically more than 8 Nexus data (MDO) lines are connected to the target debug connector by configuring on-chip Nexus module for operation with 8 or less data lines (where possible). For majority of MPC5xxx microcontrollers, it's possible to configure on-chip Nexus module to broadcast Nexus information through variable amount of Nexus data (MDO) lines. For instance, MPC555x can be configured for 4 or 12-bit Nexus port operation, MPC551x for 8 or 12 bit Nexus port operation, etc… Note that Nexus port bandwidth proportionally drops off when less Nexus data (MDO) lines are used and trace overflows are more likely to occur. If maximum bandwidth is needed, use IC50152, MPC5xxx Nexus 16-bit cable adapter.

Jumper J2 (EVTIN)

Under some circumstances it can happen that the debugger cannot find any absolute program counter message in the analyzed Nexus trace block. Consequentially, trace reconstruction fails and errors or nothing gets displayed in the trace window. To avoid such situations, the debugger can feed periodic signal to the EVTIN CPU pin connecting to the on-chip Nexus engine, which then periodically generates and broadcasts program counter synchronization messages.
In order to use this feature, jumper J2 must be bridged and the 'Force periodic Nexus SYNC' option in the 'Hardware/emulation Options/CPU Setup/Nexus' tab must be checked. Refer to iSYSTEM 'Freescale MPC5xxx & ST SPC56 Family On-Chip Emulation' technical notes document for more details on the 'Force periodic Nexus SYNC' option use.

Note that the EVTI (Nexus Event In) CPU pin may be shared with other CPU functionalities. For instance, on MPC5516 the same pin can operate as GPIO, EBI read/write or EVTI. Whenever the CPU pin is configured and used for EVTI alternate operation, J2 must not be populated in order to prevent electrical conflicts.

Note: In general there is no need to use 'Force periodic Nexus SYNC' functionality unless a specific application code is traced, which does not generate messages containing absolute program counter information. As long as the user has no problems with the trace use, it is recommended to keep jumper 2 disconnected.

Note: Jumper J2 was introduced with rv:B1, previous versions (rv: A1, A2) do not have this jumper.

The following pinout is valid on the target side:

Signal direction	Signal	Pin	Pin	Signal	Signal direction
	NC	1	2	NC	
	NC	3	4	NC	
	NC	5	6	NC	
	NC	7	8	NC	
I/O	RSTIN	9	10	EVTIN	O
I	TDO	11	12	VTREF	I
	NC	13	14	NC	
O	TCK	15	16	MDO7	I
O	TMS	17	18	MDO6	I
O	TDI	19	20	MDO5	I
O	NTRST	21	22	MDO4	I
	NC	23	24	MDO3	I
	NC	25	26	MDO2	I
	NC	27	28	MDO1	I
	NC	29	30	MDO0	I
	NC	31	32	EVTO	I
	NC	33	34	MCKO	I
	NC	35	36	MSEO1	I
	NC	37	38	MSEO0	I

MPC5xxx and SPC56 16-bit Nexus target pinout

Note: Mictor 38-pin MPC5xxx Nexus 8-bit Cable Adapter features resettable fuses on pins 9, 10, 11, 12, 15, 17, 19 and 21. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. Signals on pins 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36 and 38 are protected via 47 ohm serial resistors.

The adapter connects to the target via a 38-pin Mictor connector (Tyco Electronics 5767055-1). A target should feature a matching part (for example Tyco Electronics 5767081-1 in SMT technology).

- Mictor 38-pin MPC5xxx Nexus 16-bit Cable Adapter

Ordering code	IC50152
	IC50152-12

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Freescale MPC5xxx or ST SPC56 based target via Nexus debug interface. It connects between the Debug/Trace module and the target debug connector. It can be used for targets featuring Mictor 38-pin target debug connector with MPC5xxx Nexus pinout.
IC50152 features a standard connection length (cca. 24 cm). An adapter with shorter cable length (12 cm) was introduced (ordering code IC50152-12) for cases when standard length doesn't work e.g. due to a badly designed target PCB where reliable Nexus trace capture with the standard 24 cm cable cannot be achieved. In such cases, shorter cable helps. In practice, IC50152-12 is sometimes used in conjunction with the MPC5646C (3M Bolero) target device, which internally seems to lack from fast drivers on the Nexus signals.

Jumper J2 (EVTIN)

Under some circumstances it can happen that the debugger cannot find any absolute program counter message in the analyzed Nexus trace block. Consequentially, trace reconstruction fails and errors or nothing gets displayed in the trace window. To avoid such situations, the debugger can feed periodic signal to the EVTIN CPU pin connecting to the on-chip Nexus engine, which then periodically generates and broadcasts program counter synchronization messages.
In order to use this feature, jumper J2 must be bridged and the 'Force periodic Nexus SYNC' option in the 'Hardware/emulation Options/CPU Setup/Nexus' tab must be checked. Refer to iSYSTEM 'Freescale MPC5xxx & ST SPC56 Family On-Chip Emulation' technical notes document for more details on the 'Force periodic Nexus SYNC' option use.

Note that the EVTI (Nexus Event In) CPU pin may be shared with other CPU functionalities. For instance, on MPC5516 the same pin can operate as GPIO, EBI read/write or EVTI. Whenever the CPU pin is configured and used for EVTI alternate operation, J2 must not be populated in order to prevent electrical conflicts..

Note: In general there is no need to use 'Force periodic Nexus SYNC' functionality unless a specific application code is traced, which does not generate messages containing absolute program counter information. As long as the user has no problems with the trace use, it is recommended to keep jumper 2 disconnected.

Note: Jumper J2 was introduced with rv: N1, previous versions (rv: M1) do not have this jumper.

The following pinout is valid on the target side:

Signal direction	Signal	Pin	Pin	Signal	Signal direction
I	MDO12	1	2	MDO13	I
I	MDO14	3	4	MDO15	I
I	MDO9	5	6	NC	
	NC	7	8	MDO8	I
I/O	RSTIN	9	10	EVTIN	O
I	TDO	11	12	VTREF	I
I	MDO10	13	14	NC	I
O	TCK	15	16	MDO7	I
O	TMS	17	18	MDO6	I
O	TDI	19	20	MDO5	I
O	NTRST	21	22	MDO4	I
I	MDO11	23	24	MDO3	I
	NC	25	26	MDO2	I
	NC	27	28	MDO1	I
	NC	29	30	MDO0	I
	NC	31	32	EVTO	I
	NC	33	34	MCKO	I
	NC	35	36	MSEO1	I
	NC	37	38	MSEO0	I

MPC5xxx and SPC56 16-bit Nexus target pinout

Note: Mictor 38-pin MPC5xxx Nexus 16-bit Cable Adapter features resettable fuses on pins 9, 10, 11, 12, 15, 17, 19 and 21. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. Signals on pins 1, 2, 3, 4, 5, 8, 13, 14, 16, 18, 20, 22, 23, 24, 26, 28, 30, 32, 34, 36 and 38 are protected via 47 ohm serial resistors.

The adapter connects to the target via a 38-pin Mictor connector (Tyco Electronics 5767055-1). A target should feature a matching part (for example Tyco Electronics 5767081-1 in the SMT technology).

Ordering code	**IAMIC38SAM50MPC**

IAMIC38SAM50MPC adapter

Some targets based on Freescale Qorivva Power Architecture or PX Series Power Architecture microcontroller(s) (e.g. MPC5675K) can also feature a 50-pin Samtec ERF8-025 connector for the Nexus debug interface instead of a popular 38-pin Mictor connector. In this case, the IAMIC38SAM50MPC adapter is connected to the target first and then used in conjunction with Mictor 38-pin MPC5xxx Nexus 16-bit Cable Adapter.
In practice, it has been noticed that 50-pin Samtec target connector does not provide good mechanical stability in one direction which as a result can also yield electrically unreliable connection. Special care must be taken when connecting this adapter to the target Samtec connector to minimize potential connection problems. Note that no problems have been detected or reported in conjunction with the Mictor connector.

The following pinout is valid on the target side:

Signal direction	Signal	Pin	Pin	Signal	Signal direction
I	MSEO0	1	2	VTREF	
I	MSEO1	3	4	TCK	O
	GND	5	6	TMS	O
I	MDO0	7	8	TDI	O
I	MDO1	9	10	TDO	I
	GND	11	12	NTRST	O
I	MDO2	13	14	RDY	
I	MDO3	15	16	EVTI	O
	GND	17	18	EVTO	I
I	MCKO	19	20	JTAG_RST	O
I	MDO4	21	22	NC	
	GND	23	24	GND	
I	MDO5	25	26	NC	
I	MDO6	27	28	NC	
	GND	29	30	GND	
I	MDO7	31	32	NC	
I	MDO8	33	34	NC	
	GND	35	36	GND	
I	MDO9	37	38	NC	
I	MDO10	39	40	NC	
	GND	41	42	GND	
I	MDO11	43	44	MDO13	I
I	MDO12	45	46	MDO14	I
	GND	47	48	GND	
I	MDO15	49	50	NC	

50-pin Samtec ERF8 Nexus target connector pinout

The adapter connects to the target via a 50-pin ERM8 connector (for example SAMTEC: ERM8-025-01-L-D-EM2-TR). A target should feature a matching part (for example SAMTEC: ERF8-025-05.0-L-DV).

- 16-pin 2.54mm Freescale COP Cable Adapter

Ordering code	IC50153

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Freescale MPC6xx, MPC82xx, MobileGT, MPC7xx or MPC83xx based target via COP/JTAG debug interface. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 16-pin 2.54 pitch target debug connector with Freescale COP pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
I	Standard JTAG	TDO	1	2	QACK#	100-ohm pull-down	O
O	Standard JTAG	TDI	3	4	TRST	Standard JTAG	O
I	Status (optional)	HALTED	5	6	VTref	Reference voltage	I
O	Standard JTAG	TCK	7	8	CKSTP_IN	Status (optional)	O
O	Standard JTAG	TMS	9	10	NC	Not Connected	
O	Soft Reset	SRESET	11	12	GND	Ground	
O	Hard Reset	HRESET	13	14	NC	Not Connected	
I	Status (optional)	CKSTP_OUT	15	16	GND	Ground	

16-pin Freescale COP target pinout

Note: 16-pin 2.54mm Freescale COP Cable Adapter features resettable fuses on all pins except for pin 15. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. A signal on pin 15 is protected via 100 ohm serial resistor.

The adapter connects to the target via a 16-pin 2.54 mm connector (for example Yamaichi: FAS-1601-2101-2-OBF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 016 216 21).

- 51-pin GLENAIR Cable Adapter

Ordering code	IC50154

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Freescale MPC5xxx or ST SPC5xxxx based target via Nexus debug interface. It connects to Debug/Trace module on one side and to the target debug connector on the other side. Typically it's used in conjunction with targets operating in harsh environments, featuring a robust 51-pin GLENAIR target debug connector instead of the popular 38-pin Mictor target debug connector.

The following pinout is valid on the target side:

Signal direction	Signal	Pin	Pin	Signal	Signal direction
	NC	1	2	NC	
	NC	3	4	NC	
I	TDO	5	6	RDY	
O	RESET	7	8	VTREF	I
O	EVTIN	9	10	GND	
O	TRST	11	12	GND	
O	TMS	13	14	GND	
O	TDI	15	16	GND	
O	SWCLK/TCK	17	18	GND	
I	MDO0	19	20	GND	
I	MCKO	21	22	GND	
I	EVTO	23	24	GND	
I	MSEO0	25	26	MDO9	I
I	MDO1	27	28	GND	
I	MDO2	29	30	GND	
I	MDO3	31	32	GND	
	NC	33	34	GND	
I	MSEO1	35	36	GND	
I	MDO4	37	38	GND	
I	MDO5	39	40	GND	
I	MDO6	41	42	GND	
I	MDO7	43	44	GND	
I	MDO8	45	46	GND	
I	MDO10	47	48	GND	
I	MDO11	49	50	GND	
	NC	51			

51-pin GLENAIR target pinout

Note: 51-pin GLENAIR Cable Adapter features resettable fuses on pins 5, 6, 7, 8, 9, 11, 13 and 15. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. Signals on pins 19, 21, 23, 25, 26, 27, 29, 31, 35, 37, 39, 41, 43, 45, 47, 49 and GND are protected via 47 ohm serial resistors.

The adapter connects to the target via a 51-pin GLENAIR connector (for example GLENAIR - M83513/02-GN). A target should feature a matching part (for example GLENAIR - M83513/01-GN).

- Mictor 38-pin PPC4xx RISCTrace Cable Adapter

Ordering code	IC50155

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Applied Micro PPC4xx based target via RISCTrace debug interface. It connects between the Debug/Trace module and the target debug connector. It can be used for targets featuring Mictor 38-pin target debug connector with PPC4xx RISCTrace pinout.

The following pinout is valid on the target side:

Signal direction	Signal	Pin	Pin	Signal	Signal direction
	NC	1	2	NC	
	NC	3	4	NC	
	GND	5	6	TRCLK	I
O	HALT	7	8	NC	
O	SRST	9	10	NC	
I	TDO	11	12	VREF	I
	NC	13	14	NC	
O	TCK	15	16	NC	
O	TMS	17	18	NC	
O	TDI	19	20	NC	
O	NTRST	21	22	NC	
	NC	23	24	NC	
I	BS0	25	26	TS0	I
I	BS1	27	28	TS1	I
I	BS2	29	30	TS2	I
I	BS3	31	32	TS3	I
I	BS4	33	34	TS4	I
I	BS5	35	36	TS5	I
I	BS6	37	38	TS6	I

PPC4xx RISCTrace target pinout

Note: Mictor 38-pin MPC5xxx Nexus 16-bit Cable Adapter features resettable fuses on pins 7, 9, 11, 12, 15, 17, 19 and 21. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. Signals on pins 6, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37 and 38 are protected via 47 ohm serial resistors.

The adapter connects to the target via a 38-pin Mictor connector (Tyco Electronics 5767055-1). A target should feature a matching part (for example Tyco Electronics 5767081-1 in SMT technology).

- 50-pin Samtec MPC5xxx Nexus 16-bit Cable Adapter

Ordering code	IC50156

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Freescale MPC5xxx or ST SPC56 based target via Nexus debug interface. It connects between the Debug/Trace module and the target debug connector. It can be used for targets featuring 50-pin Samtec ERF8-025 target debug connector with MPC5xxx Nexus pinout.

Note: In practice, it has been noticed that 50-pin Samtec target connector does not provide good mechanical stability in one direction which as a result can also yield electrically unreliable connection. Special care must be taken when connecting this adapter to the target Samtec connector to minimize potential connection problems. Note that no problems have been detected or reported in conjunction with the Mictor connector.

Jumper J2 (EVTIN)

Under some circumstances it can happen that the debugger cannot find any absolute program counter message in the analyzed Nexus trace block. Consequentially, trace reconstruction fails and errors or nothing gets displayed in the trace window. To avoid such situations, the debugger can feed periodic signal to the EVTIN CPU pin connecting to the on-chip Nexus engine, which then periodically generates and broadcasts program counter synchronization messages.
In order to use this feature, jumper J2 must be bridged and the 'Force periodic Nexus SYNC' option in the 'Hardware/emulation Options/CPU Setup/Nexus' tab must be checked. Refer to iSYSTEM 'Freescale MPC5xxx & ST SPC56 Family On-Chip Emulation' technical notes document for more details on the 'Force periodic Nexus SYNC' option use.

Note that the EVTI (Nexus Event In) CPU pin may be shared with other CPU functionalities. For instance, on MPC5516 the same pin can operate as GPIO, EBI read/write or EVTI. Whenever the CPU pin is configured and used for EVTI alternate operation, J2 must not be populated in order to prevent electrical conflicts..

Note: In general there is no need to use 'Force periodic Nexus SYNC' functionality unless a specific application code is traced, which does not generate messages containing absolute program counter information. As long as the user has no problems with the trace use, it is recommended to keep jumper 2 disconnected.

The following pinout is valid on the target side:

Signal direction	Signal	Pin	Pin	Signal	Signal direction
I	MSEO0	1	2	VTREF	
I	MSEO1	3	4	TCK	O
	GND	5	6	TMS	O
I	MDO0	7	8	TDI	O
I	MDO1	9	10	TDO	I
	GND	11	12	NTRST	O
I	MDO2	13	14	NC	
I	MDO3	15	16	EVTI	O
	GND	17	18	EVTO	I
I	MCKO	19	20	JTAG_RST	O
I	MDO4	21	22	NC	O
	GND	23	24	GND	
I	MDO5	25	26	NC	
I	MDO6	27	28	NC	
	GND	29	30	GND	
I	MDO7	31	32	NC	
I	MDO8	33	34	NC	
	GND	35	36	GND	
I	MDO9	37	38	NC	
I	MDO10	39	40	NC	
	GND	41	42	GND	
I	MDO11	43	44	MDO13	I
I	MDO12	45	46	MDO14	I
	GND	47	48	GND	
I	MDO15	49	50	NC	

MPC5xxx and SPC56 50-pin 16-bit Nexus target pinout

Note: 50-pin Samtec MPC5xxx Nexus 16-bit Cable Adapter features resettable fuses on pins 2, 4, 6, 8, 10, 12, 16 and 20. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. All other signals are protected via 47 ohm serial resistor.

The adapter connects to the target via a 50-pin Samtec connector (SAMTEC ERM8-025-01-L-D-EM2). A target should feature a matching part (for example SAMTEC - ERF8-025-05.0-L-DV in the SMT technology).

- Mictor 38-pin MPC5xx Nexus 8-bit Cable Adapter

Ordering code	IC50158

This adapter is used to connect the iC5000 development system to Freescale MPC56x target via Nexus debug interface. It connects between the Debug/Trace module and the target debug connector. It can be used for targets featuring Mictor 38-pin target debug connector with MPC5xx Nexus pinout.

The following pinout is valid on the target side:

Signal direction	Signal	Pin	Pin	Signal	Signal direction
O	~EVTI	1	2	VENDOR_IO2	I/O
	(Reserved)	3	4	(Reserved)	
	(Reserved)	5	6	MCKO	I
O	MDI1	7	8	VENDOR_IO1	I/O
O	~RESET	9	10	~EVTO	I
	(Reserved)	11	12	VREF	
	(Reserved)	13	14	(Reserved)	
O	MCKI	15	16	(Reserved)	
O	~MSEI	17	18	(Reserved)	
O	MDI0	19	20	(Reserved)	
O	~RSTI	21	22	(Reserved)	
I	MDO0	23	24	(Reserved)	
I	MDO1	25	26	(Reserved)	
I	MDO2	27	28	(Reserved)	
I	MDO3	29	30	(Reserved)	
I	MDO4	31	32	(Reserved)	
I	MDO5	33	34	(Reserved)	
I	MDO6	35	36	(Reserved)	
I	MDO7	37	38	~MSEO	I

MPC5xx 8-bit Nexus target pinout

Note: Mictor 38-pin MPC5xx Nexus 16-bit Cable Adapter features resettable fuses on pins 2, 9, 12, 21. The fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. Signals on pins 6, 8, 10, 23, 25, 27, 29, 31, 33, 35, 37 and 38 are terminated via 47 ohm resistors.

The adapter connects to the target via a 38-pin Mictor connector (Tyco Electronics: 5767055-1). A target should feature a matching part (for example Tyco Electronics: 5767081-1 or 2-5767004-2 in the SMT technology).

To connect this cable adapter to the AMPMODU System 50 target connector, an additional adapter is included:

Nexus 50-pin AMPMODU System 50 target connector

Nexus 50-pin AMPMODU System 50 adapter

The following pinout is valid on the target side:

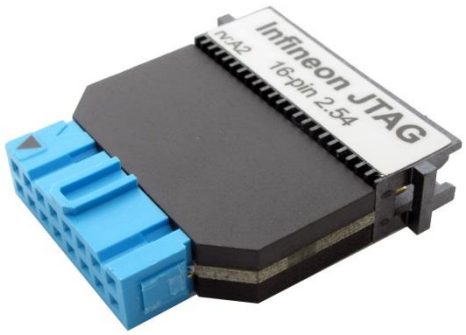
Signal direction	Signal	Pin	Pin	Signal	Signal direction
	NC	1	2	NC	
	NC	3	4	NC	
	NC	5	6	NC	
O	~RESET	7	8	VREF	
O	~EVTI	9	10	NC	
O	~RSTI	11	12	NC	
O	~MSEI	13	14	NC	
O	MDI0	15	16	NC	
O	MCKI	17	18	GND	
	MDO0	19	20	GND	
I	MCKO	21	22	GND	
I	~EVTO	23	24	GND	
I	~MSEO	25	26	VENDOR_IO1	I/O
I	MDO1	27	28	GND	
I	MDO2	29	30	GND	
I	MDO3	31	32	GND	
O	MDI1	33	34	GND	
	NC	35	36	GND	
I	MDO4	37	38	GND	
I	MDO5	39	40	GND	
I	MDO6	41	42	GND	
I	MDO7	43	44	GND	
	NC	45	46	GND	
	NC	47	48	GND	
I/O	VENDOR_IO2	49	50	GND	

Nexus 50-pin AMPMODU System 50 target connector

The adapter connects to the target via a 50-pin AMPMODU System 50 connector (for example TE Connectivity: 5-104550-6). A target should feature a matching part (for example TE Connectivity: 5-104549-7).

- 16-pin 2.54mm Infineon JTAG Cable Adapter

Ordering code	IC50160



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Infineon XC166, XC2000 and TriCore based target via JTAG debug interface. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 16-pin 2.54mm pitch target debug connector with Infineon JTAG pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
O	Standard JTAG	TMS	1	2	VTref	Reference voltage	I
I	Standard JTAG	TDO	3	4	GND	Ground	
O	(optional)	CPUCLK	5	6	GND	Ground	
O	Standard JTAG	TDI	7	8	RESET	Power On Reset	O
O	Standard JTAG	TRST	9	10	BRK_OUT	Break Output	I
I	Standard JTAG	TCLK	11	12	GND	Ground	
O	Break Input	BRK_IN	13	14	OCDS_E	(optional)	O
	Not Connected	NC	15	16	NC	Not Connected	

16-pin Infineon JTAG target pinout

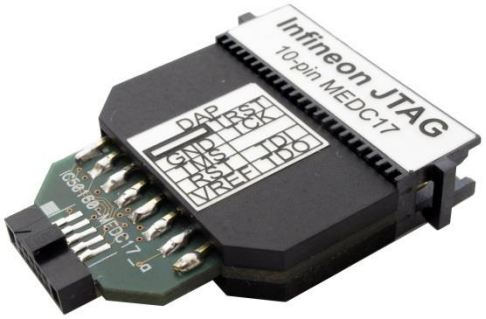
Mandatory pins on the microcontroller side are TMS, TDO, TDI, TRST, TCLK and RESET. BRK_IN and BRK_OUT signals can be used optionally.

Note: 16-pin 2.54mm Infineon JTAG Cable Adapter features resettable fuses on all connected pins. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

The adapter connects to the target via a 16-pin 2.54 mm connector (for example Yamaichi: FAS-1601-2101-2-OBF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 016 216 21).

- 10-pin 1.27mm Tricore MEDC17 Cable Adapter

Ordering code	IC50160-MEDC17



This connector has been defined by Bosch and supports JTAG debug interface.

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Infineon XC166, XC2000 and TriCore based target via JTAG debug interface. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 10-pin 1.27 mm pitch target debug connector with Bosch MEDC17 pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
O	Break Input	~BRK_IN	1	2	~TRST	Standard JTAG	O
	Ground	GND	3	4	TCLK	Standard JTAG	O
O	Standard JTAG	TMS	5	6	~BRK_OUT	Break Output	I
O	Power On Reset	~RESET	7	8	TDI	Standard JTAG	O
I	Reference voltage	VTref	9	10	TDO	Standard JTAG	I

10-pin Bosch MEDC17 target pinout

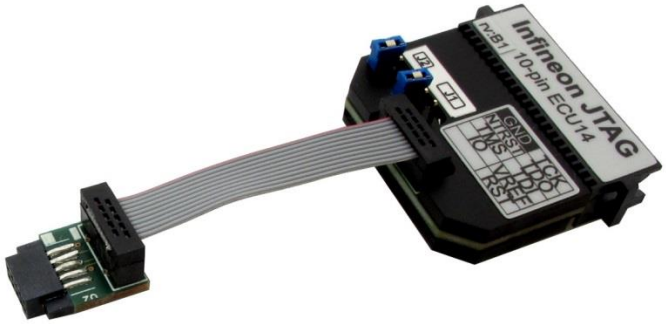
Mandatory pins on the microcontroller side are TMS, TDO, TDI, ~TRST, TCLK and ~RESET. ~BRK_IN and ~BRK_OUT signals can be used optionally.

Note: 10-pin 1.27mm Tricore MEDC17 Cable Adapter features resettable fuses on all connected pins. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

The adapter connects to the target via a 10-pin 1.27mm connector (for example SAMTEC: FFSD-05-01-N). A target should feature a matching part (for example SAMTEC: SHF-105-01-L-D-TH).

- 10-pin 1.27mm Tricore ECU14 Cable Adapter

Ordering code	IC50160-ECU14



This connector has been defined by Bosch and supports JTAG debug interface.

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Infineon XC166, XC2000 and TriCore based target via JTAG debug interface. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 10-pin 1.27 mm pitch target debug connector with Bosch ECU14 pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
	Ground	GND	1	2	TCLK	Standard JTAG	O
O	Standard JTAG	~TRST	3	4	TDO	Standard JTAG	I
O	Standard JTAG	TMS	5	6	TDI	Standard JTAG	O
I/O	User specific	USERIO	7	8	Vref	Reference voltage	I
	Not Connected	NC	9	10	~RESET	Power On Reset	O

10-pin Bosch ECU14 target pinout

Mandatory pins on the microcontroller side are TMS, TDO, TDI, ~TRST, TCLK and ~RESET. USERIO signal can be used optionally.

Note: 10-pin 1.27mm TriCore ECU14 Cable Adapter features resettable fuses on all connected pins. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

Jumper J1

Jumper J1 has been put on the adapter only for making provision for future extensions of the "ECU14" target connection. The USERIO signal (target debug connector pin 7) is connected to the emulator output (J1 position 1-2) or to the emulator input (J1 position 2-3). Currently the signal has no functionality and consequentially J1 is not populated. Shall the USERIO signal become functional, the jumper position will become relevant and a support from the emulator will be required.

Jumper J2

Jumper J2 is optional and by default not populated. It connects 10k pull-down resistor to the USERIO pin when bridged.
The jumper has been introduced for a custom target, where the target watchdog gets disabled during the debugging, when low level at the USERIO signal (target debug connector pin 7) is detected.

The adapter connects to the target via a 10-pin 1.27mm connector (for example SAMTEC: SFM-105-01-S-D). A target should feature a matching part (for example SAMTEC: TFM-105-01-L-D).

- 10-pin 1.27mm Infineon DAP Cable Adapter

Ordering code	IC50161

Note: This product is obsolete and is fully replaced with IC50163

This adapter is used to connect the iC5000 development system to Infineon XC166, XC2000 or TriCore based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 10-pin 1.27mm pitch target debug connector with Infineon DAP pinout.

From Rev. E1 on, Infineon 3-pin DAP debug interface (Wide Mode) is supported (labeled “Infineon DAP2”). Older revisions support 2-pin DAP (one clock line + one bidirectional data line) interface only (labeled “Infineon DAP”).

From Rev. D1 on, Hot Attach operation without connecting/disconnecting the adapter from the target is supported. Rev. D1 newly introduces jumper J1.

With jumper J1 in position 1-2 (default), normal debug operation is configured. The debugger drives MCU reset line low during the initial debug connection and then takes control over the microcontroller.

With jumper J1 in position 2-3, Hot Attach operation is configured. In this case, all debug signals from the iC5000 unit are disconnected and the target starts running as soon as the power is applied to the target. When Hot Attach command is issued from winIDEA, the debugger connects to the MCU and control over the MCU is taken without resetting the MCU. Depending on the target MCU, refer to the XC166/XC2000 or the TriCore technical notes document for more details on Hot Attach configuration and use.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
I	Reference voltage	Vref	1	2	DAP1	Bidirectional data	I/O
	Ground	GND	3	4	DAP0	DAP clock	O
	Ground	GND	5	6	USER_IO	Optional	O
	Not Connected	NC	7	8	USER_IN	Optional	O
	Ground	GND	9	10	RESET	System Reset	I/O

10-pin Infineon DAP pinout

Note: 10-pin 1.27mm Infineon DAP Cable Adapter features resettable fuses on pins 1, 2, 3, 4, 5, 6, 8, 9 and 10. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

The adapter connects to the target via a 10-pin 1.27mm connector (for example SAMTEC: FFSD-05-01-N). A target should feature a matching part (for example SAMTEC: SHF-105-01-L-D-TH).

- 6-pin 2.54mm Infineon I2C Cable Adapter

Ordering code	IC50162

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Infineon SP37/SP40 based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 6-pin 2.54mm pitch target debug connector with Infineon I2C pinout.

The following pinout is valid on the target side:

Pin	Signal	Signal description	Signal direction
1	VDDBAT	Reference voltage	
2	PP0		I/O
3	PP1		I/O
4	GND	Ground	
5	PP2		I/O
6	PP3		I/O

6-pin 2.54mm Infineon I2C pinout

Note: 6-pin 2.54mm Infineon I2C Cable Adapter features resettable fuses on pins 1, 2, 3, 4, 5 and 6. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

Emulation Notes

MCU can run in normal, debug or programming mode. Mode is always selected after power on and cannot be changed later. Because of this VDDBAT (pin 1 on the debug connector) is a power supply output from the emulator and **the target power supply (battery) must be removed while debugging**. Before the debug download takes place, power off/on sequence is generated by the emulator and programming mode selected. During the debug download, first user flash is erased, then the application code programmed into the flash and at the end the complete flash is read back. This last step is required since the code memory can be no longer read once the MCU is in the debug mode. Beside of the user flash, SP41 has also Firmware ROM which cannot be read by the debugger.
After the debug download, the MCU is reset again since it was in the programming mode during the debug download. This means a power off/on sequence is initiated again and the debug mode selected. This same sequence is also applied when debug reset command is executed from winIDEA.
During debugging (MCU in debug mode) two hardware execution breakpoints are available. No software breakpoints in flash are available since user flash cannot be modified in the debug mode.
Real time access is not available.

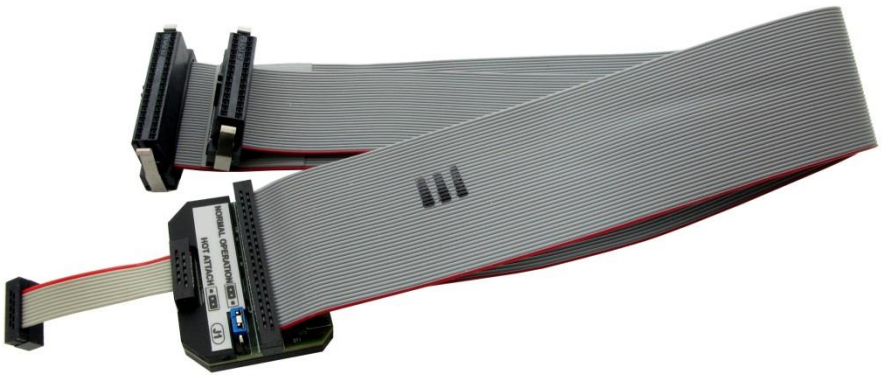
On-chip debug logic does not implement a stop command. Therefore the MCU cannot be stopped by the debugger while the application is running. MCU will stop only if hardware execution breakpoint is hit.

Note: 4-pin “connector” located on the side of the adapter is meant for future extensions of debug functionalities. Currently it provides no functionality.

The adapter connects to the target via a 6-pin 2.54 mm connector (for example LUMBERG: 2,5 MBX 06). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 613 006 111 21).

- 10-pin 1.27mm Infineon DAP2 Wide Cable Adapter

Ordering code	IC50163



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Infineon XC166, XC2000 or TriCore based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 10-pin 1.27mm pitch target debug connector with Infineon DAP pinout.

From revision E1 on, Infineon 3-pin DAP debug interface (Wide Mode) is supported (labeled "Infineon DAP2").

Jumper J1

With jumper J1 in position 1-2 (default), normal debug operation is configured. The debugger drives MCU reset line low during the initial debug connection and then takes control over the microcontroller.

With jumper J1 in position 2-3, Hot Attach operation is configured. In this case, all debug signals from the iC5000 / iC5500 / iC6000 unit are disconnected and the target starts running as soon as the power is applied to the target. When Hot Attach command is issued from winIDEA, the debugger connects to the MCU and control over the MCU is taken without resetting the MCU. Depending on the target MCU, refer to the XC166/XC2000 or the TriCore technical notes document for more details on Hot Attach configuration and use.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
I	Reference voltage	Vref	1	2	DAP1	Bidirectional data	I/O
	Ground	GND	3	4	DAP0	DAP clock	O
	Ground	GND	5	6	DAP2	Bidirectional data	I/O
	Not Connected	NC	7	8	USER_IN	Optional	O
	Ground	GND	9	10	RESET	System Reset	I/O

10-pin Infineon DAP pinout

Note: 10-pin 1.27mm Infineon DAP Cable Adapter features resettable fuses on pins 1, 2, 3, 4, 5, 6, 8, 9 and 10. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

The adapter connects to the target via a 10-pin 1.27mm connector (for example SAMTEC: FFSD-05-01-N). A target should feature a matching part (for example SAMTEC: SHF-105-01-L-D-TH).

- 16-pin 2.54mm Renesas 78K0R Serial Cable Adapter

Ordering code	IC50170

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Renesas 78K0R based target via Serial debug interface. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 16-pin 2.54 pitch target debug connector with 78K0R pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
	Ground	GND	1	2	RESET OUT	Reset Out	O
I/O	Communication line	TOOL0 (RxD/TxD)	3	4	Vcc	Power Supply	I/O
I/O	Communication line	TOOL0 (RxD/TxD)	5	6	NC	Not Connected	
	Not Connected	NC	7	8	NC	Not Connected	
	Not Connected	NC	9	10	NC	Not Connected	
	Not Connected	NC	11	12	NC	Not Connected	
	Not Connected	NC	13	14	FLMD0	Flash Mode	O
I	Reset In	RESET IN	15	16	TOOL1 (CLK)	Clock Input	I

16-pin Renesas 78K0R Serial Debug target pinout

If the 'Supply 5V to the target' option is checked in the 'Hardware/Emulation Options/CPU Setup/Advanced' tab, the debugger supplies 5V at Vcc pin (pin 4) of the target debug connector, which can be used to power the target. Maximum target current consumption should not exceed 50mA.

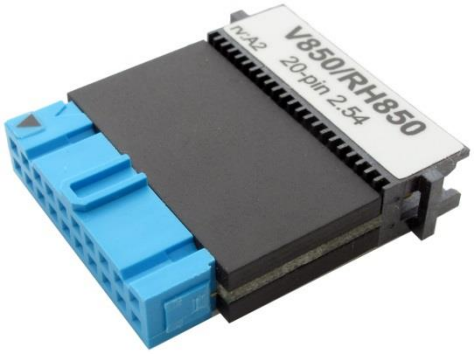
Note: 16-pin Renesas 78K0R Serial Debug Cable Adapter features resettable fuses on all connected pins. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

Note: If 'RESET IN' (target reset detection) is not connected to the target debug connector, make sure that 10k pull up is connected to this pin (target debug connector pin 15) or the debugger may exhibit unpredictable behaviour.

The adapter connects to the target via a 16-pin 2.54 mm connector (for example Yamaichi: FAS-1601-2101-2-OBF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 016 216 21).

- 20-pin 2.54mm Renesas V850/RH850 Cable Adapter

Ordering code	IC50171



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Renesas V850 based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 20-pin 2.54 pitch target debug connector with V850 pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
	Ground	GND	1	2	TCK	Debug JTAG	O
	Ground	GND	3	4	TMS	Debug JTAG	O
	Ground	GND	5	6	TDI	Debug JTAG	O
	Ground	GND	7	8	TRST	Debug JTAG	O
	Ground	GND	9	10	NC	Not Connected	
	Ground	GND	11	12	RESET	CPU Reset	I/O
	Ground	GND	13	14	FLMD0	Flash Mode	O
	Ground	GND	15	16	~RDY	Synchronization	I
	Ground	GND	17	18	TDO	Debug JTAG	I
	Ground	GND	19	20	V_{DD}	Reference voltage	I

20-pin Renesas V850/RH850 target pinout

Note: 20-pin 2.54mm V850/RH850 Cable Adapter features resettable fuses on all pins except for pin 16. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. A signal on pin 16 is protected via 100 ohm serial resistor.

The adapter connects to the target via a 20-pin 2.54 mm connector (for example Yamaichi: FAS-2001-2101-2-OBF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 020 216 21).

- 26-pin KEL Renesas V850 Cable Adapter

Ordering code	IC50172

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Renesas V850 based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 26-pin KEL target debug connector with V850 pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
	Ground	GND	B1	A1	Reserved	Reserved	
	Ground	GND	B2	A2	Reserved	Reserved	
	Ground	GND	B3	A3	Reserved	Reserved	
	Ground	GND	B4	A4	Reserved	Reserved	
	Ground	GND	B5	A5	Reserved	Reserved	
	Ground	GND	B6	A6	Reserved	Reserved	
	Ground	GND	B7	A7	DDI	N-Wire	O
	Ground	GND	B8	A8	DCK	N-Wire	O
	Ground	GND	B9	A9	DMS	N-Wire	O
	Ground	GND	B10	A10	DDO	N-Wire	I
	Reserved	Reserved	B11	A11	DRST	N-Wire	O
	Reserved	Reserved	B12	A12	RESET	Reset	O
I	Reference Voltage	VTRef	B13	A13	FLMD0	Flash Mode	O

26-pin Renesas V850 target pinout

Note: 26-pin KEL V850 Cable Adapter features resettable fuses on all connected signals. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

This adapters ends with a KEL connector (part number 8825E-026-175). Normally, the target side has KEL connector, part number 8830E-026-170S populated. For more details see 8825E Series at http://www.kel.jp/.

- 14-pin 2.54mm Renesas SuperH Cable Adapter

Ordering code	IC50173

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Renesas SuperH based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 14-pin 2.54 pitch target debug connector with SuperH pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
O	Debug JTAG	TCK	1	2	NC	Not Connected	
O	Debug JTAG	NTRST	3	4	ASEMD	Status read	I
I	Debug JTAG	TDO	5	6	GND	Ground	
O	Mode select	ASEBRK	7	8	VTREF	Reference voltage	O
O	Debug JTAG	TMS	9	10	GND	Ground	
O	Debug JTAG	TDI	11	12	GND	Ground	
	RESET IN	RESET	13	14	GND_DETECT	Ground detect	I

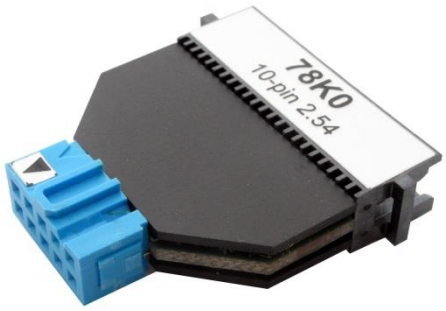
14-pin SuperH target pinout

Note: 14-pin 2.54mm SuperH cable adapter features resettable fuses on all pins except for pin 14, where serial resistor of 100ohm and pull up resistor of 10k ohm is used. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

The adapter connects to the target via a 14-pin 2.54 mm connector (for example Yamaichi: FAS-1401-2101-2-OBF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 014 216 21).

- 10-pin 2.54mm Renesas 78K0 Serial Cable Adapter

Ordering code	IC50174



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Renesas 78K0 based target via Serial debug interface. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 10-pin 2.54 pitch target debug connector with 78K0 pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
I	Reset In	RESET IN	1	2	RESET OUT	Reset Out	O
O	Flash Mode	FLMD0	3	4	TARVCC	Target Vcc	I
I/O	Communication line	X2	5	6	GND	Ground	
O	Communication line	X1	7	8	GND	Ground	
	Not Connected	NC	9	10	5V OUT	5V Power Supply	O

10-pin Renesas 78K0 Serial Debug target pinout

If the 'Supply 5V to the target' option is checked in the 'Hardware/Emulation Options/CPU Setup/Advanced' tab, the debugger supplies 5V at 5V OUT pin (pin 10) of the target debug connector, which can be used to power the target. Maximum target current consumption should not exceed 50mA.

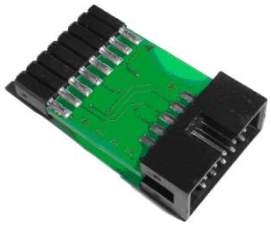
Note: 10-pin Renesas 78K0R Serial Debug Cable Adapter features resettable fuses on all connected pins. These protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

Note: If 'RESET IN' (target reset detection) is not connected to the target debug connector, make sure that 10k pull up is connected to this pin (target debug connector pin 1) or the debugger may exhibit unpredictable behavior.

The adapter connects to the target via a 10-pin 2.54 mm connector (for example Yamaichi: FAS-1001-2101-2-OBF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 010 216 21).

An additional adapter (ordering code IAPIN10PIN16NEC78K) must be ordered separately in order to connect to a target featuring 16-pin 2.54 pitch target debug connector.

Ordering code	IAPIN10PIN16NEC78K



IAPIN10PIN16NEC78K

With this adapter, the following pinout is valid on the target side:

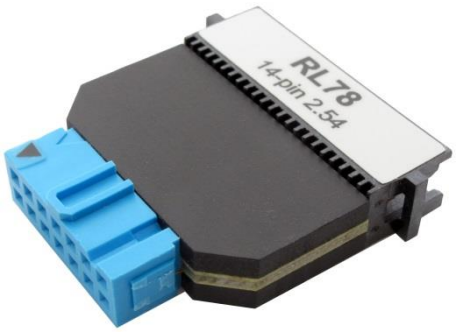
Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
	Ground	GND	1	2	RESET OUT	Reset Out	O
	Not Connected	NC	3	4	TARVCC	Target Vcc	I
	Not Connected	NC	5	6	NC	Not Connected	
	Not Connected	NC	7	8	NC	Not Connected	
O	Communication line	X1	9	10	NC	Not Connected	
	Not Connected	NC	11	12	NC	Not Connected	
I/O	Communication line	X2	13	14	FLMD0	Flash Mode	O
I	Reset In	RESET IN	15	16	NC	Not Connected	

16-pin Renesas 78K0 Serial Debug target pinout

The adapter connects to the target via a 10-pin 2.54 mm connector (for example Yamaichi: FAS-1001-2101-2-OBF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 010 216 21).

- 14-pin 2.54mm Renesas RL78 Serial Cable Adapter

Ordering code	IC50175



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Renesas RL78 based target via Serial debug interface. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 14-pin 2.54 pitch target debug connector with RL78 pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
	Not Connected	NC	1	2	GND	Ground	
	Not Connected	NC	3	4	NC	Not Connected	
I/O	Communication line	TOOL0	5	6	RESET_IN	Reset In	I
	Not Connected	NC	7	8	VDD	Power supply pin	
	Power supply pin	EVDD	9	10	RESET_OUT	Reset Out	O
	Not Connected	NC	11	12	GND	Ground	
O	Reset Out	RESET_OUT	13	14	GND	Ground	

14-pin Renesas RL78 Serial Debug target pinout

If the ‘Supply 5V to the target’ option is checked in the ‘Hardware/Emulation Options/CPU Setup/Advanced’ tab, the debugger supplies 5V at VDD pin (pin 8) of the target debug connector, which can be used to power the target. Maximum target current consumption should not exceed 50mA.

Some RL78 devices may have two power supply pins (EVDD and VDD). Both must be connected to debug connector.

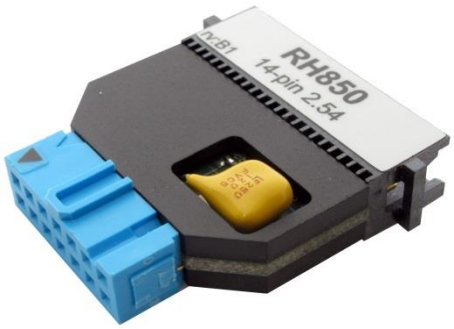
If ‘Vref’ option for Debug I/O levels is checked in the ‘Hardware/Emulation Options/Hardware’ tab the EVDD on pin 9 is used as TAR-VREF.

Note: If ‘RESET IN’ (target reset detection) is not connected to the target debug connector, make sure that 10k pull up is connected to this pin (target debug connector pin 6) or the debugger may exhibit unpredictable behavior.

The adapter connects to the target via a 14-pin 2.54 mm connector (for example Yamaichi: FAS-1401-2101-2-OBF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 014 216 21).

- 14-pin 2.54mm Renesas RH850 Cable Adapter

Ordering code	IC50176



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Renesas V850 based target. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 14-pin 2.54 pitch target debug connector with V850 pinout.

The following pinout is valid on the target side:

Signal direction	Signal description	Signal	Pin	Pin	Signal	Signal description	Signal direction
O	Debug JTAG	TCK	1	2	GND	Ground	
O	Debug JTAG	TRST	3	4	FLMD0	Flash Mode	O
I	Debug JTAG	TDO	5	6	FLMD1	Flash Mode	O
O	Debug JTAG	TDI	7	8	VTREF	Reference voltage	I
O	Debug JTAG	TMS	9	10	NC	Not Connected	
I	Synchronization	~RDY	11	12	GND	Ground	
I/O	CPU Reset	RESET	13	14	GND	Ground	

14-pin Renesas RH850 target pinout

Note: 14-pin 2.54mm RH850 Cable Adapter features resettable fuses on all pins except for pin 11. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. A signal on pin 11 is protected via 22 ohm serial resistor.

The adapter connects to the target via a 14-pin 2.54 mm connector (for example Yamaichi: FAS-1401-2101-2-OBF). A target should feature a matching part (for example WÜRTH ELEKTRONIK: 612 014 216 21).

- Mictor 38-pin Renesas RH850 Nexus 16-bit Cable Adapter

Ordering code	IC50177

This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to Renesas RH850 based target exposing Nexus trace interface over the Mictor 38-pin connector. It connects to Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring Mictor 38-pin debug & trace connector with the RH850/F1H Nexus pinout.

Jumper J1 on the adapter can be used to isolate (jumper removed) the target microcontroller EVTI input pin from the debugger, which can optionally control it too.

The following pinout is valid on the target side:

Signal direction	Signal	Pin	Pin	Signal	Signal direction
I	MDO12	1	2	MDO13	I
I	MDO14	3	4	MDO15	I
I	MDO9	5	6	NC	
	NC	7	8	MDO8	I
O	NRESET	9	10	EVTI	O
I	TDO	11	12	VTREF	I
I	MDO10	13	14	~RDY	I
O	TCK	15	16	MDO7	I
O	TMS	17	18	MDO6	I
O	TDI	19	20	MDO5	I
O	TRST	21	22	MDO4	I
I	MDO11	23	24	MDO3	I
	NC	25	26	MDO2	I
	NC	27	28	MDO1	I
	NC	29	30	MDO0	I
	NC	31	32	EVTO	I
	NC	33	34	MCKO	I
	NC	35	36	MSEO1	I
O	FLMD0	37	38	MSEO0	I

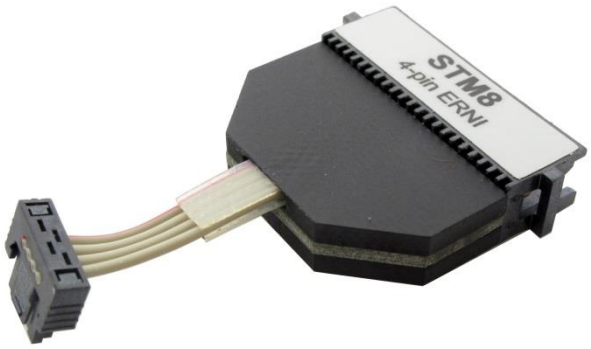
Mictor 38-pin Renesas RH850/F1H 16-bit Nexus target pinout

Note: Mictor 38-pin Renesas RH850 Nexus 16-bit Cable Adapter features resettable fuses on pins 9, 11, 12, 15, 17, 19, 21, 37. Fuse on pin 33 is not assembled. The fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away. All other signals are protected via 47 ohm serial resistor.

The adapter connects to the target via a 38-pin Mictor connector (Tyco Electronics 5767055-1). A target should feature a matching part (for example Tyco Electronics 5767081-1 in SMT technology).

- 4-pin ERNI ST STM8 Cable Adapter

Ordering code	IC50190



This adapter is used to connect the iC5000 / iC5500 / iC6000 development system to ST STM8 based target. It connects to the Debug/Trace module on one side and to the target debug connector on the other side. It can be used for targets featuring 4-pin ERNI target debug connector with the STM8 pinout.

The following pinout is valid on the target side:

Pin	Signal	Signal description	Signal direction
1	VDD	Reference voltage	I
2	SWIO	Debug SWIM pin	I/O
3	GND	Ground	
4	RST	Reset	O

4-pin ERNI ST STM8 target pinout

Note: 4-pin ERNI ST STM8 Cable Adapter features resettable fuses on all pins. These fuses protect debug signals against overcurrent and cycle back to a conductive state after the excessive current fades away.

The adapter ends with the ERNI MiniBridge 4-pin connector female (P/N 839033). On the target side, ERNI MiniBridge 4-pin connector right angle male (P/N 214012) or ERNI MiniBridge 4-pin connector vertical male (P/N 284697) can be used.

Troubleshooting

It is highly recommended to read the technical notes document for your specific microcontroller family before contacting iSYSTEM technical support. This document can be downloaded from www.isystem.com but typically it comes delivered with the development system. It contains all the information related to the debugging including some troubleshooting tips.

Operating Environment:

Operating temperature: between 10°C and 40°C
Humidity: 5% to 80% RH
Storage temperature: between -10°C and 60°C

Dimensions: 127 x 127x 54 mm

Note: Consult with iSYSTEM when using equipment outside of these parameters.